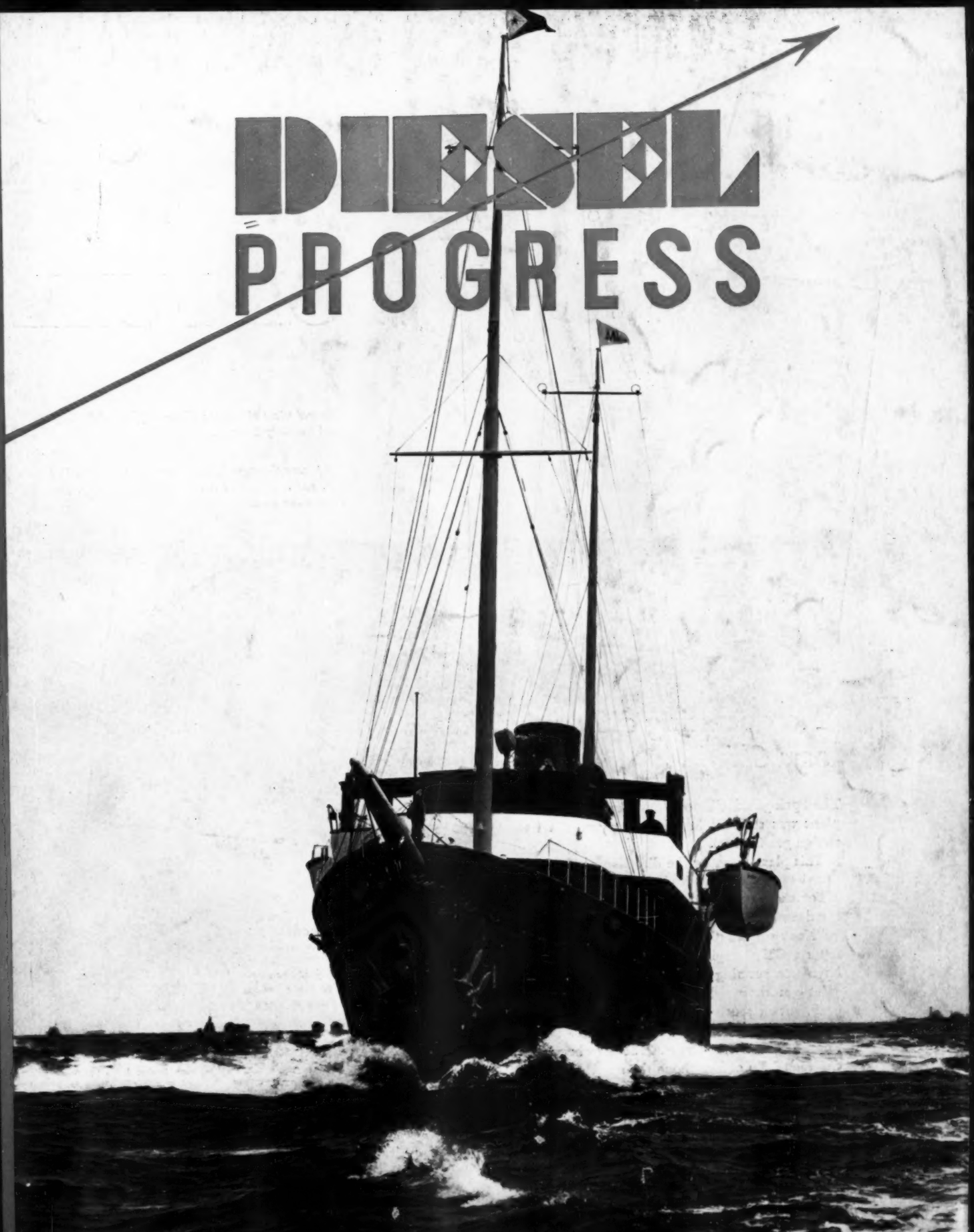
DIESEL PROGRESS

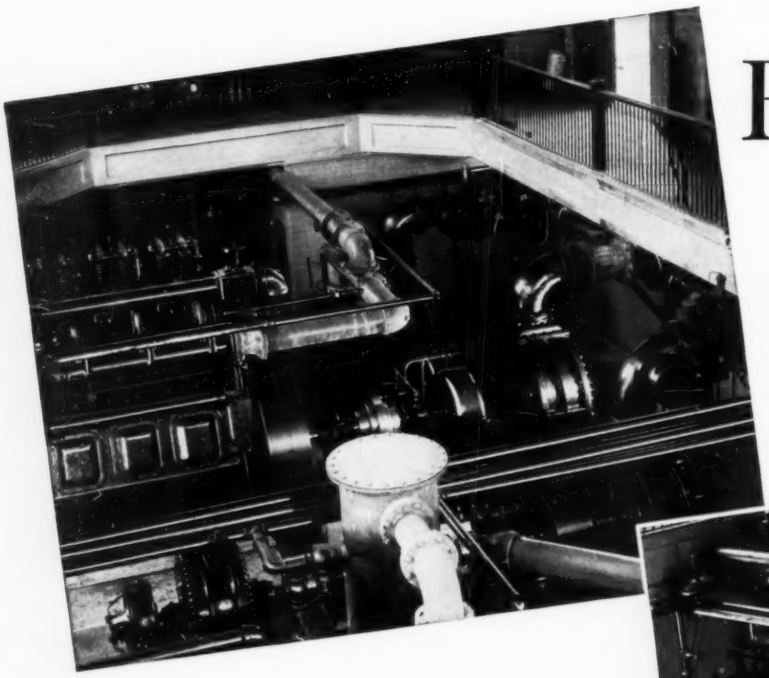
IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR



JANUARY, 1939 CIRCULATION OF THIS ISSUE — IN EXCESS OF 14,000 COPIES 25c

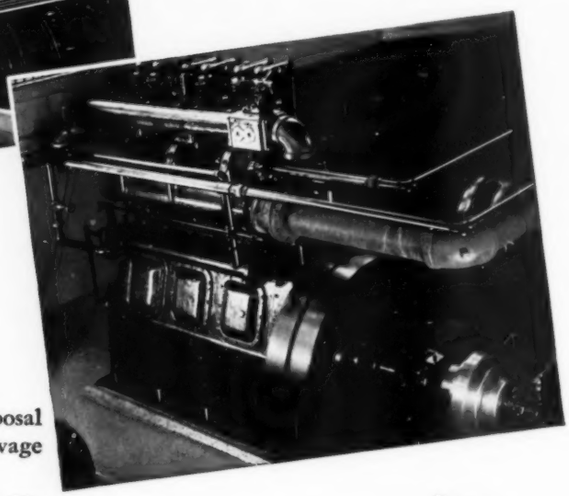
Sewage Sludge Gas

FOR FUEL!



General view of sewage disposal plant of Springfield Sanitary District.

To power these pumps, a Worthington 3-cyl. 180 h.p. gas engine and a Clark 6-cyl. 146 h.p. gas engine are used.



"No operating difficulties," *says Chief . . .*

The Springfield (Illinois) Sanitary District sewage disposal plant was the first in this country to use its own sewage sludge gas for fuel.

This plant is under the direction of W. B. Walraven, national authority on utilizing sludge gas as fuel.

For the past 3 years, their gas engines have been lubricated exclusively with Texaco Ursa Oil.

"Not a single operating difficulty traceable to lubrication," reports Chief Engineer Walraven, although these engines have been running 24 hours a day for 5 months at a time.

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The Texas Company, 135 East 42nd St., New York City.

DIESEL OPERATION, *Texaco's 80-page booklet for Diesel operators. Charts, diagrams, drawings, interesting text, just the dope you want to have handy. Yours for the asking.*

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TEXACO *Algol and Ursa Oils*

FOR LUBRICATING DIESEL AND GAS ENGINES

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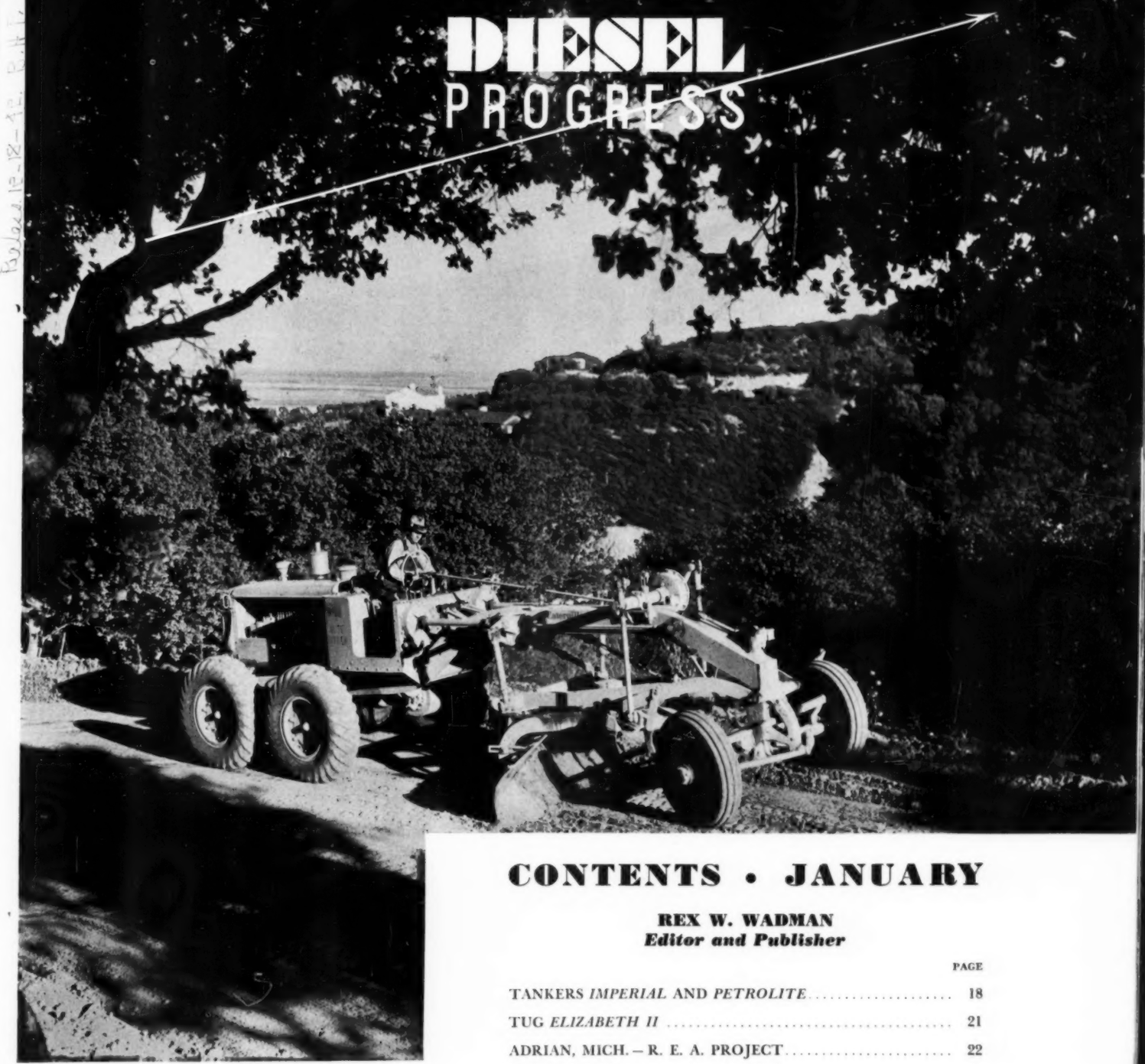
DIESEL PROGRESS



FRONT COVER ILLUSTRATION: *Kenkora II* — 190 ft. Diesel express cruiser owned by Kenneth G. Smith of Chicago, built by the Bath Iron Works, designed by Gielow, Inc., and powered with a pair of 8-cylinder Cooper-Bessemer Diesel Engines.

TABLE OF CONTENTS ILLUSTRATION: This Caterpillar Diesel Auto Patrol is used for rebuilding the winding, steep streets in the beautiful Hillsborough, California, suburb. It works eight hours a day on fifteen gallons of fuel.

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REX W. WADMAN
Editor and Publisher

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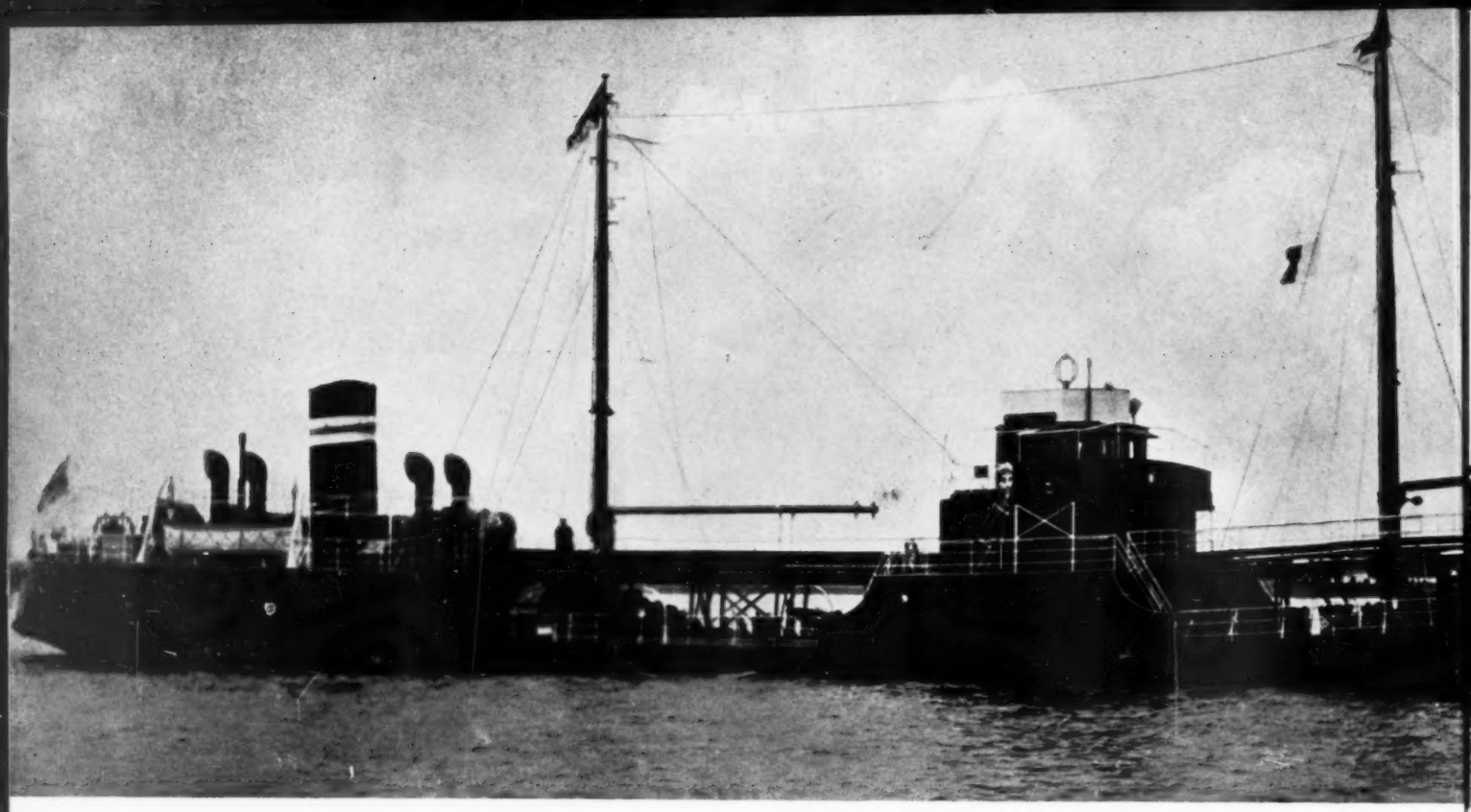


MOTOR TANKERS "IMPERIAL" AND "PETROLITE"

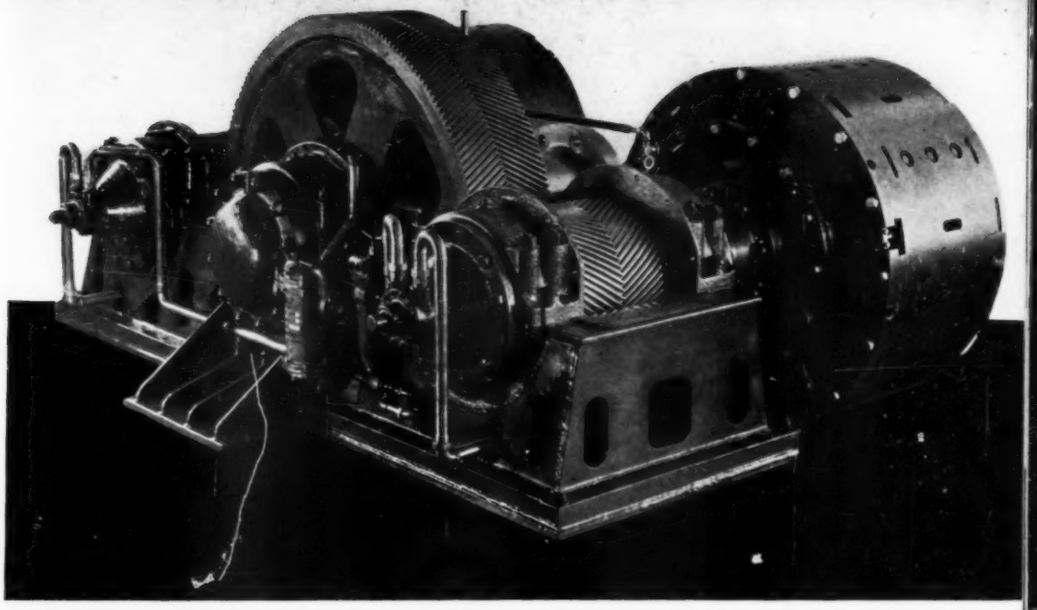
First Commercial Reduction Gear — Electro-magnetic Slip Coupling Marine Drives in the Western Hemisphere

A GREAT many oil companies have built a great many tankers but it can be stated without fear of contradiction that no tankers for any company have ever received or deserved more favorable attention from both American and Canadian marine authorities than the two vessels recently delivered to the Imperial Oil Shipping Company, Ltd., of Toronto. To the casual observer watching trials of the *Imperial* in Collingwood Bay on November 21st, or of the *Petrolite* a week later at Sorel, where the Richelieu River joins the St. Lawrence, there was little to indicate from the external appearance of these two ships that other than conventional design was being successfully demonstrated. However, to the several score of qualified experts on board in each case representing the owners, Lloyds Register of Shipping, the United States Maritime Commission, the Canadian National Defense Council and foremost ship and machinery builders of both countries, there was much to place them far in advance of present merchant ship design and construction. Here were commercial applications for the first time in the New World of a revolutionary type of marine drive with no connection or contact whatsoever between main engines and the propeller shaft.

The technical discussion of this new and unusual method of power transmission will be appreciated better if preceded by a brief description of the vessels' general characteristics. The *Imperial* and *Petrolite* are sister ships from plans by the Imperial Oil Shipping Company's naval architect, Mr. Peter Duncan. Construction to Lloyds' plus 100 A-1 specifications was entrusted to The Collingwood Shipyards, Ltd., Collingwood, Ontario and Marine Industries, Ltd., of Montreal, respectively.

Principal dimensions are as follows:

Length between perpendiculars	230′ 0″
Beam moulded	39′ 0″
Draft moulded	16′ 10½″
Displacement (salt water)	3,140 tons



Farrel-Birmingham double pinion, single reduction, gear with Elliott electro-magnetic slip couplings as installed in both the "Imperial" and "Petrolite" Tankers.

Among the guests and interested observers aboard the "Petrolite" during her sea trial were: MM. Jos. Simard, President of Marine Industries, Ltd.; H. J. Rahlves, Vice-President and General Manager of Imperial Oil Shipping Company, Ltd., Toronto; A. D. M. Curry, Chief Engineer, Minister of National Defense; M. McD. Duff, Assistant to the President of the Canadian Pacific Steamships; Charles J. Brittain, President, Fairbanks-Morse, Ltd.; Edouard Simard, Vice-President of the Marine Industries, Ltd.; C. W. Flescher, Maritime Commission of the United States; K. O. Keel of the General Motors Corporation; W. D. Frayne, R. L. Youngson and E. H. Thomas of the Farrel-Birmingham Company; B. C. Seaman, The Elliott Company; R. F. Dimmitt of the McColl Frontenac Oil Co., Ltd.; W. M. Nichols and H. C. Lenfest of the American Locomotive Co.; E. de G. Power, Vice-President, Marine Industries, Ltd.; F. T. Norris, Superintendent of the Canada Steamship Lines, Ltd.; Geo. Allan and Alexander Hislop of Lloyds Register Shipping; D. B. Carswell, Minister of the Federal Transports, and other government and commercial marine authorities.

Guaranteed speed, which was well exceeded on the trial trips of both ships, is 11.25 knots with a cargo capacity fully loaded of approximately 13,000 barrels. Particularly excellent jobs of welded hull fabrication were executed by both yards and each vessel in turn was immediately accepted by Mr. H. J. Rahlves, Vice-President and General Manager of the Imperial Oil Shipping Company, at the conclusion of her respective trials. In fact, the owners' confidence in workmanship, materials and machinery was perfectly demonstrated when, after approximately seven hours of sea trials, the *Petrolite* was ordered to proceed at once to Tulara, Peru, for her first cargo assignment. The *Imperial*, also, was dispatched at once for her home port at Ioco, British Columbia, via the Panama Canal where she will be inspected by interested United States Naval authorities. First available records of fuel consumption indicate that both vessels are remarkably economical in service. On the first run from Sarnia to Port Colborn the *Imperial* burned only 27 barrels of fuel oil as against the usual 96 barrels for a steamship of comparable power and capacity. Similarly, from Montreal to Halifax, each tanker consumed 105 barrels as opposed to 309 previously required for equivalent steam operation. As indicated by the illustrations these new tankers conform to the best accepted general design for this type vessel and are distinguished by outstanding machinery installation rather than unusual hull feature of design.

The engine room is located aft as is customary and contains the usual auxiliary equipment, fire, sanitary, bilge and cargo pumps, all motor-driven. Both ships are equipped to carry mixed grades of oil or gasoline and are fitted with four cargo pumps, each of which with its re-

spective piping system is independent of the others to insure complete flexibility for loading or unloading. A 100 hp. oil-fired boiler provides ample steam for heating both crew quarters and cargo when necessary. Electric power for lighting and general service in port is furnished by a 3 cylinder, 30 hp. Fairbanks-Morse Diesel generator set operating at 1,200 rpm. A 6 cylinder, 75 hp. Gleniffer Diesel generator set provides additional electric power when under way with the main engine generator uncoupled.

With this general picture of the vessels in mind let us proceed to examine the main propulsion drives which were responsible for the almost unprecedented interest displayed at the trials. The twin main engines for each ship were also furnished by Fairbanks, Morse & Company, Ltd. They were Model 37, 2 cycle, 7 cylinder Diesels which develop 730 hp. each at 400 rpm. They are placed in reversed position to normal with drive shafts extending from both ends. Immediately aft and connected by pneumatic clutches are a pair of 210 kw. generators for supplying power to cargo pumps. Obviously these are disengaged while at sea. Engine-mounted equipment includes an "Alnor" pyrometer, Weston tachometers, Maxim silencers and Nugent fuel oil filters. The remarkable propulsion drive is placed forward of the main engines and connects to the propeller shaft which is carried between them on three 18 inch white metal steady bearings. Because this method of power transmission is the first of its kind ever to be installed commercially on this side of the Atlantic, a detailed description will be given.

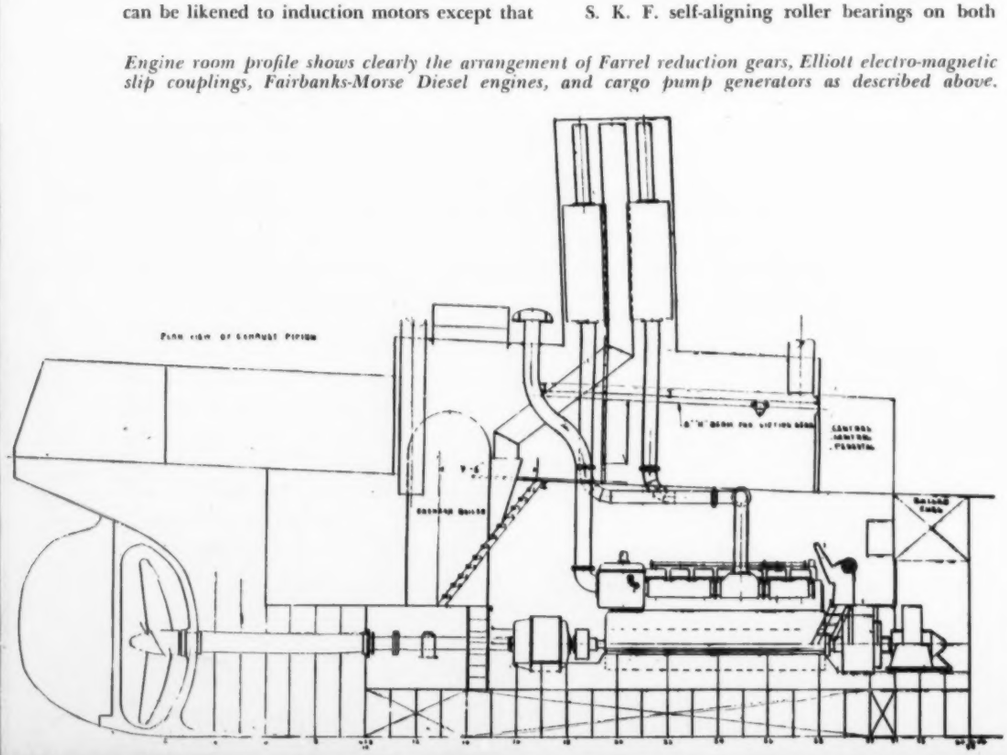
The main engine crankshafts are connected to the Farrel-Birmingham reduction gears through Elliott electro-magnetic slip couplings. These can be likened to induction motors except that both rotor and stator turn in the same direction and at substantially the same speed. The armature or inner member is rigidly mounted to the main engine crankshaft while the field or outer members is integral with the reduction gear pinion shaft. An air gap of ample proportions separates the two parts of the coupling. Electric current amounting to about 1 per cent of the power transmitted is introduced to the field through collector rings and brushes. This sets up a magnetic flux which holds the outer member in practically constant relation to the armature regardless of its angular speed or direction. The well-known Elliott "double diamond cage" construction is employed to insure maximum torque with minimum current. Obviously, engine and gear are instantly uncoupled by throwing the proper switch on the engineer's control panel and demagnetizing the coupling.

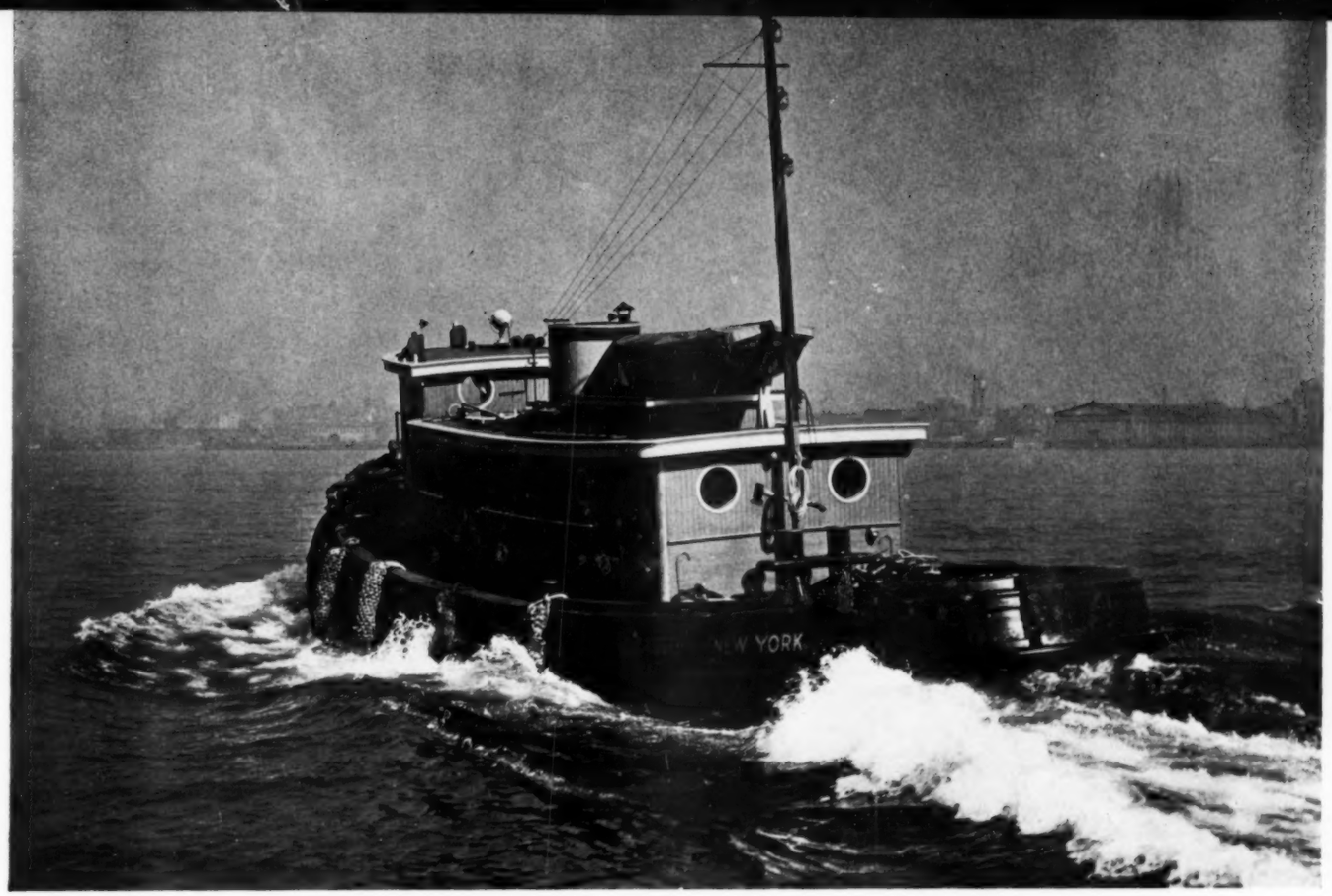
The reduction gears, supplied by the Farrel-Birmingham Company, Inc., are the double pinion, single reduction type with a ratio of 3.2:1 to give an efficient propeller speed of 125 rpm. The pinions and their respective shafts are produced from heat-treated alloy steel forgings and the driving gear is of steel rim construction mounted on a casting of high tensile iron. Both pinions and gears are cut with the well-known Farrel-Sykes generated, continuous herring-bone teeth with a pressure angle of 20 degrees and a helical angle of 30 degrees. All shafts are ground to finished dimensions with tolerances of plus .001 in. and minus .000 in. Accurate engineering and careful shop practice combine to give efficiencies above 98 per cent. The welded steel case is simple, sturdy and rigid with minimum weight consistent with strength. Aside from the Timken thrust bearing it is fitted throughout with S. K. F. self-aligning roller bearings on both pinions and the main shaft forward. Two inspection plates and the flanged design of the top provide complete accessibility for inspection and routine maintenance. Positive pressure lubrication protects all vital points regardless of the vessel's trim under any load conditions. A self-reversing pump and pressure filter with cooler integrally mounted assure plenty of clean cooled lubricating oil at all times. In this connection it is noteworthy that all lubrication requirements for all of the wide range of machinery installed on these ultra-modern vessels are satisfactorily met by various "Imperial" products. Similarly, Imperial Diesel and boiler fuel oils are used exclusively.

The advantages of the Elliott electro-magnetic slip coupling and Farrel reduction gear drive are many and obvious. Tremendous savings in propulsion machinery space and weight result from the use of high speed multiple units. This results directly in greater earning power for the vessel through increased cargo capacity. Either Diesel can be instantly uncoupled for any reason without stopping the ship which proceeds under the power of the remaining unit. Since there is no mechanical connection between engines and the propeller shaft it is impossible to have high frequency vibrations from the crankshaft or shocks from fouling the propeller transmitted beyond the coupling. Also, when calculating critical frequencies it is not necessary to consider the drive system beyond the coupling which simplifies the problem materially. Maneuvering in close quarters is greatly improved through the very low propeller speeds possible without a corresponding reduction in power. In practically all cases these vessels will be handled in the customary manner with the engine controls. It is possible, however, when maneuvering conditions warrant, to speed up response to bridge signals by holding one engine at half speed "ahead" and the other at the same speed "astern" with instant ship control effected by magnetizing or demagnetizing alternate couplings.

It was natural that maximum interest on the trials, centered about the couplings and gears. Everyone, without exception, was very favorably impressed by the design, construction and operation of both. The management of the Imperial Oil Shipping Company are to be congratulated upon their courage and foresight in appreciating and installing this new type of marine drive. There can be no doubt of their faith being justified by highly profitable operation of these latest additions to the famous "Imperial fleet." That others will follow their splendid example is a foregone conclusion.

Engine room profile shows clearly the arrangement of Farrel reduction gears, Elliott electro-magnetic slip couplings, Fairbanks-Morse Diesel engines, and cargo pump generators as described above.





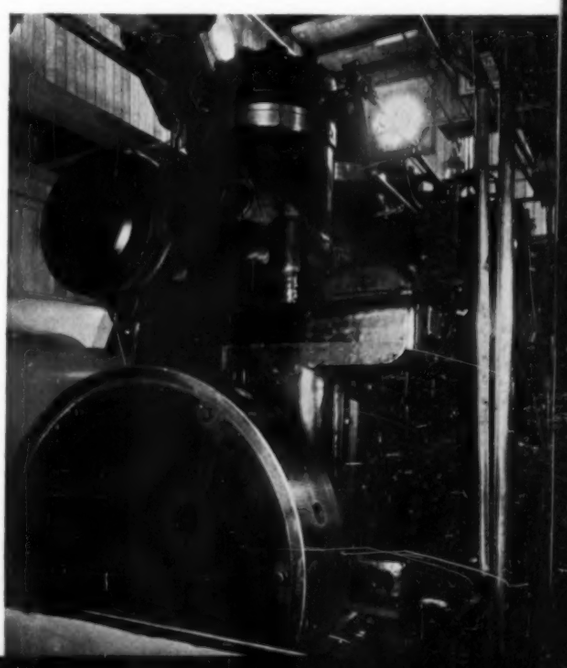
Another Diesel tug for New York Harbor on her way to a profitable towing assignment.

DIESEL TUG, "ELIZABETH II"

ACCORDING to Mr. Bernard Brinks, his latest Diesel tug, the *Elizabeth II*, is capable of holding her own against any competitive vessel in New York Harbor and neighboring waters. Such an opinion cannot be taken lightly when one considers that Mr. Brinks has operated his new vessel personally for almost a year, during which time he has faced practically every conceivable condition of weather and water to test her metal. Also, on numerous occasions she has performed continuous twenty-four hour duty with nothing but perfect response to the convenient pilothouse control.

With a light displacement of 23 tons this clean cut tugboat measures 60 ft. by 16.6 ft. by 6.4 ft. and is constructed of seasoned oak and yellow pine. A 6-cylinder, 240 hp. Fairbanks, Morse Diesel drives a three-blade Columbian propeller at 400 rpm. to provide sufficient power and speed for all requirements. The engine is equipped with an Alnor pyrometer and Maxim silencer. Other auxiliaries such as the air compressor, circulating water pump, fuel pump, filter and forced lubrication system are built-in to give an exceptionally compact installation with plenty of free engineroom space. A large storeroom is aft and forecastle forward of the engineroom with four crew bunks and corresponding lockers.

Mr. Brinks' own ability with tools is evident from the skillful manner in which the boat is finished. Her lines enhanced by the striking color combination of black hull, red superstructure and silver trim, make her one of the most outstanding tugs in the harbor. For durability all exterior hull fastenings are of bronze as are the quadrant and tail shaft. Locust wood was selected for framing and the engine bed was strengthened by inter-locking stiffening members between the fore and aft timbers. In every respect the *Elizabeth II* has been built for many years of profitable service. Her economical and dependable Diesel guarantees such a record in advance.



View of the Fairbanks-Morse Diesel, looking aft. Note the clean cut engineroom appearance. The pilothouse remote control is visible at the right.

General view of plant showing Maxim silencers and, in the rear, the Binks cooling tower.

ADRIAN, MICH.

A Rural Electrification Project

By ROY A. WHITE*

A DIESEL-ELECTRIC generating plant serving the farmers in Lenawee County, Michigan, has just been completed and put into operation. The plant contains, for the present, two 550 hp. units. Space and other provisions have been made for the installation of a third unit as soon as demanded by load conditions.

The units are housed in a new brick and concrete building. The main part of this building contains the generating room, and, in one end, a plant office, a shop, a switchgear vault, and two convenience rooms. A conference room is on a second floor above these end rooms.

The generating room contains the engines, generators, exciters, and the switchboard. All auxiliary equipment is located in a full basement under the main part of the building. A single story wing extends out from the main part of the building. In this wing is a general office and a show room.

Two 10,000-gal. fuel oil storage tanks, a Binks cooling tower, and a step-up transformer substation are located outside of the building. The fuel oil storage tanks are located near a railroad siding, and about 100 ft. from the building.

The generating system is laid out to give what might be called a "uniflow" of fuel oil, starting air, electrical energy, and cooling water. This arrangement reduces the number of crossings of pipes and conduits to a minimum, and makes it possible to arrange them largely in groups parallel to the direction of "flow." This layout facilitates installation, operation and maintenance.

The engines and generators are placed crosswise in the generating room. The switchboard is also placed crosswise, and is located at the end of the room between the plant office and the shop, and forms one side of the switch gear vault.

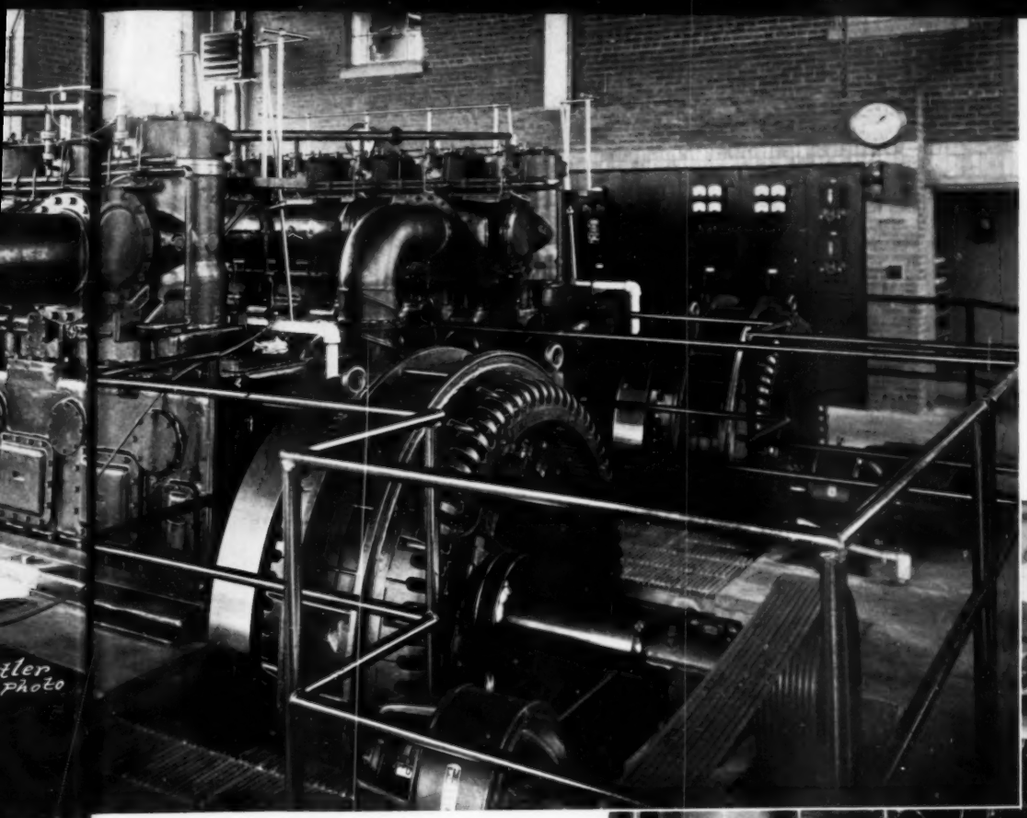
Along the basement wall at the generator side of the units a fuel oil transfer pump, two day tanks, two starting air tanks, a motor driven air compressor, and a gasoline engine driven compressor are located. Along the opposite wall of the basement the motor driven cooling water pumps, and the cooling water piping and control valves are arranged. A heat exchanger, and a lubricating oil cooler are located at the end of each engine foundation, and adjacent to the cooling water system. The lubricating oil purifying system and tanks are located in a far corner of the basement underneath the shop.

The fuel-energy flow moves along one side of the basement, across to the switchboard, and back along the opposite wall. It starts with the entrance of the fuel oil pipe from the storage tanks through the basement wall opposite the switchboard end of the building. The fuel oil flows through a transfer pump, and a meter, and into either one or both of the day tanks, one tank for each engine, and from each day tank to each engine. The energy flow is picked up by the conductors from the generators, and continues on to the switchboard. Parallel to these conductors are the conductors for the exciter and field circuits.

From the switchboard a group of parallel conductors carries current to control and drive the pump motors. Parallel cooling water pipe manifolds run along the wall above the pumps, and continue as pipes out through the end wall of the basement, and on to the Binks cooling tower.

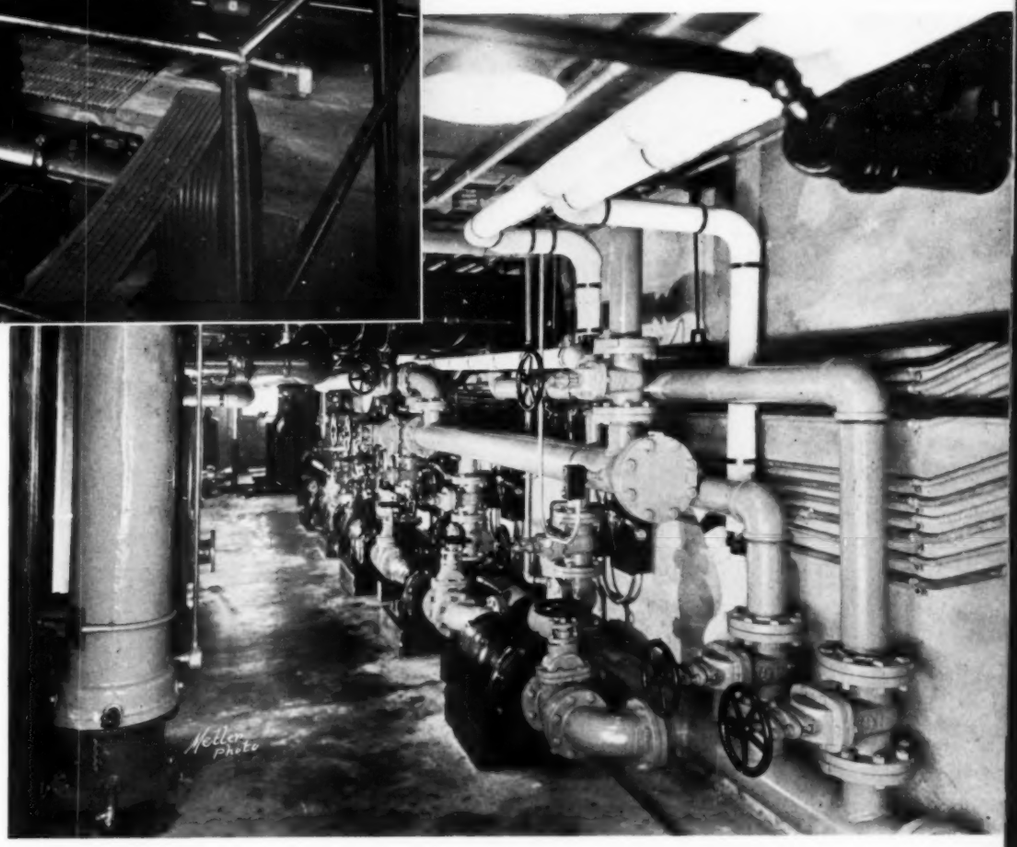
All electrical and mechanical instruments and gauges are mounted on the switchboard. This board contains nine panels. In addition, there is a swinging panel on which are mounted the totalizing instruments. The nine panels are as follows: No. 1, voltage regulators; No 2, instruments and switches for generator and exciter unit No. 1; No. 3, same for unit No. 2; No. 4, blank panel for future unit No. 3; No. 5, instruments and switches for plant feeder circuit; No. 6, main power feeder switches and

*Consulting Engineer; Project Engineer for REA Projects—Michigan 5 Lenawee, Michigan 33 Charlevoix, Michigan 41 Oceana.



General view of engine room.

Switchboard with two Alnor pyrometers mounted on the end panel.



Pump room with Schutte-Koerting heat exchangers at the left.

instruments; No. 7, blank panel for unassigned use; No. 8, push-button controls and pilot lights for plant auxiliaries, and a ten-station annunciator and alarm horn for warning when any pressure or temperature reaches a danger point; No. 9, oil, air, and water pressure gauges, two multi-station pyrometers, and a Petrometer for each day tank.

The oil circuit breakers are remote control type, and are located in the switch gear vault behind the switchboard.

The station feeder circuit drops down from the oil circuit breaker to three station transformers in the basement directly below. The secondary circuit runs up to a distribution panel in the switch gear vault.

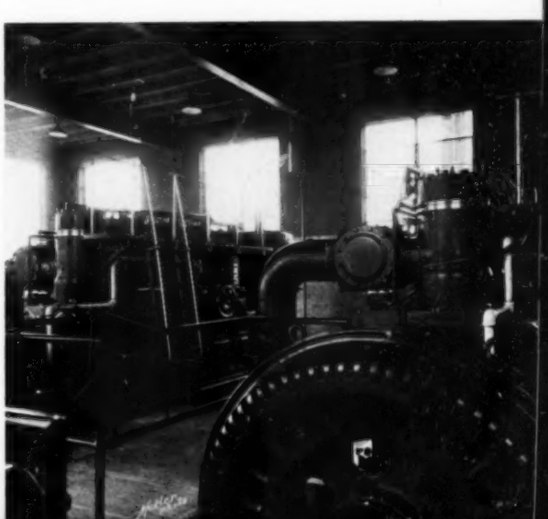
The main feeder circuit runs in conduit along the basement ceiling from below the circuit breaker, and through the side wall in a fiber duct, and continues under ground to the substation where a conduit riser brings it up to a pot head near the station buses.

The engines are Fairbanks, Morse & Co., 2-cycle, pump scavenging, Model 33-D, each with five 14″ x 17″ cylinders, direct connected to a Fairbanks, Morse & Co., alternator. A speed of 300 rpm. is maintained by Woodward Type S1 governors. Exciters are V-belt driven at 1,450 rpm. Each engine has a Model DO 4—2-cycle Maxim silencer, a Burgess air intake silencer, and an American air filter.

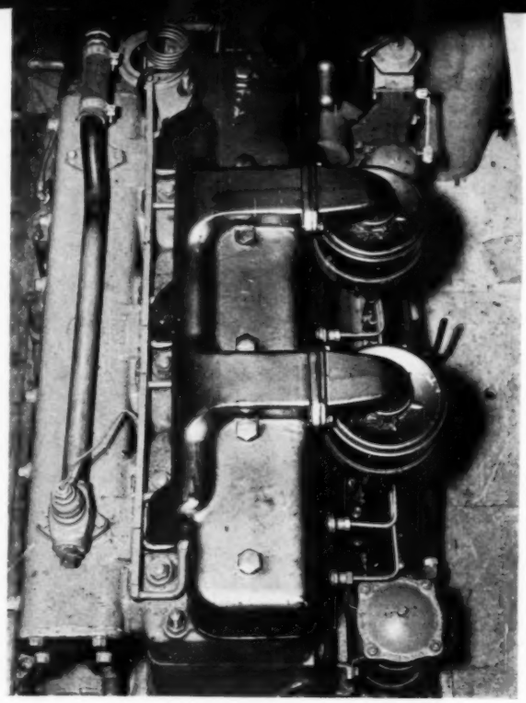
The cylinders are cooled by a closed soft water system. Each engine has its own system. Each has a separate pump, heat exchanger, and lubricating oil cooler. A common raw water system carries the heat to the cooling tower. The piping in the cooling tower is arranged so that either half of the tower can be closed. Below the tower is a concrete basin having sufficient storage capacity to care for evaporation losses during several hours of operation. This basin is divided into halves corresponding to the two halves of the tower. Either half may be drained completely.

. . . . *And now please turn to page 50*

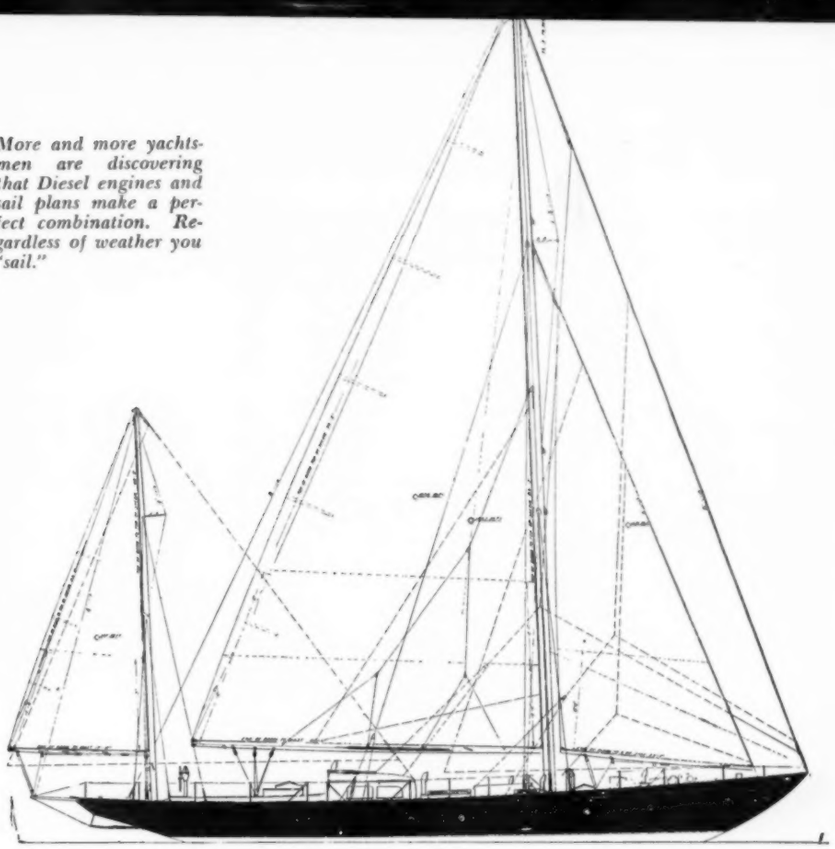
General engine room view. Skinner purifier is installed in this plant for lube oil purification.



When the wind dies, her 100 hp. Superior Diesel brings her home on time.



More and more yachtsmen are discovering that Diesel engines and sail plans make a perfect combination. Regardless of weather you "sail."



THE "ODYSSEY"

THERE are still a few hard-bitten sailors who scorn auxiliary power, preferring to lie becalmed and whistle for wind rather than start the good old "kicker" and arrive at their destination. A certain part of such obstinacy is doubtless due to the fact that many so-called "kickers" in the past have not been much more dependable than the fickle breezes they were supposed to replace and also to the universally recognized danger of carrying gasoline in too close proximity to highly inflammable sails. However, with modern marine Diesel engines these objections are no longer valid. Select any yacht club at random and you will hear countless tales of making port and dinner engagements despite calms or "pea soup" fogs with a Diesel auxiliary the hero in each case.

When Mrs. Barklie Henry commissioned Sparkman & Stephens, Naval Architects, to design her new yawl, the *Odyssey*, she wisely specified a safe, dependable and economical Diesel auxiliary. The *Odyssey* was built by Henry B. Nevins, Inc., of City Island, N. Y., to the following principal dimensions:

Length o.a.	88′ 6¾″
Length w.l.	62′ 0″
Beam	18′ 0″
Draft	10′ 8″

Her lead keel weights 50,000 pounds.

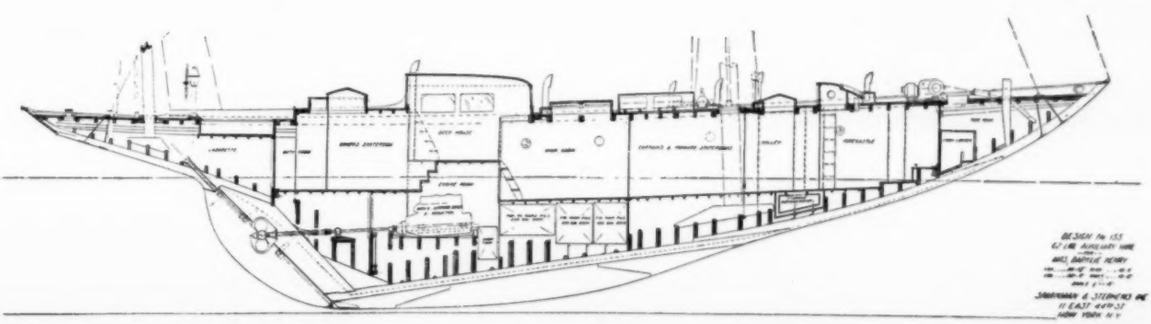
The engine selected is a 100 hp., 6-cylinder Superior Diesel which turns a three-blade Hyde propeller through a 2:1 reduction gear. There is also a 7½ kw. Diesel generator set with coupling drive which can be easily disconnected when it is desired to drive the generator from the main engine by means of a V belt. Fuel tanks of welded wrought iron have a capacity of 500 gallons which would be sufficient for approximately 750 miles of cruising with all sails furled. Other equipment consists of Exide batteries, a Bludworth Radio Direction Finder, Kenyon log, a Lux carbon dioxide fire extinguishing system and a General Electric refrigerator. Five power blowers insure ample ventilation through Johns-Mansville acoustically insulated ducts. The engineroom, also, is lined with 1¼ in. Acoustic Celotex for sound-proofing. An American Engineering Company electric windlass is complete with "wildcats" and "gypsy heads," the latter being used for hoisting sail.

The general arrangement of accommodations is clearly shown by the accompanying inboard profile. The deckhouse, forward of the owner's stateroom, has a dinette to port and a cork covered chart table to starboard. The forecastle has complete accommodations for a crew of four exclusive of the captain. The galley is trimmed with Monel metal and is completely equipped. Cooking on the Shipmate range can be done with either coal or gas as preferred.

Keel and frames are of white oak double planked with white cedar and Mexican mahogany, Everdur fastened. Deck, cabin floors, hatches, skylights and all deck trim are of teak. The yacht is yawl rigged with a total sail area of 3,453 square feet divided as follows:

Fore triangle	1,234 sq. ft.
Mainsail	1,872 sq. ft.
Mizzen	347 sq.ft.

Prescott Wilson supplied the sails and the rigging is Hazard Korodless with Truloc fittings.

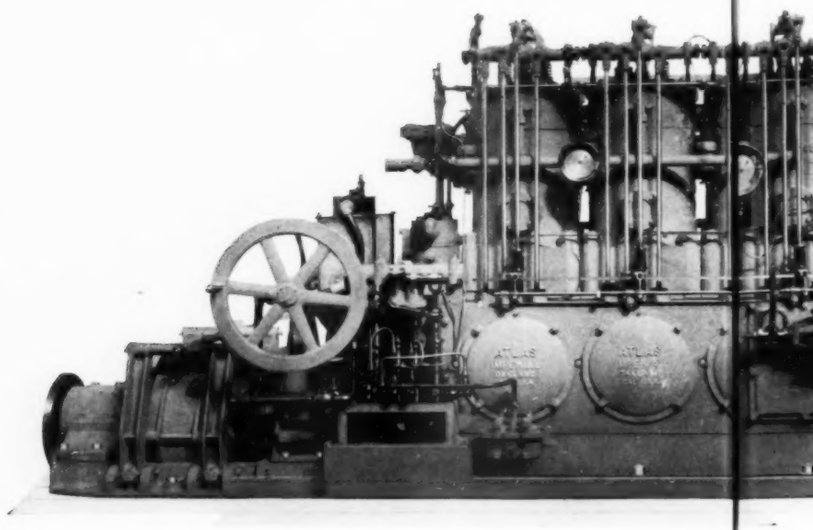


Inboard profile and accommodation plan.

Atlas Powers Majority of H

Honor Roll

Boat	Length	Owner	Atlas Diesel
Addington	54.3'	Magnus Jacobsen	75 H. P.
Aleutian	62.5'	Paul M. Pedersen	125 H. P.
Alitak	40.6'	Anton Pedersen	45 H. P.
Alma	56.2'	Henning Woog	75 H. P.
Aloha	50.0'	A. Langnes	40 H. P.
Antler	55.5'	John Pederson	75 H. P.
Arctic	55.2'	Paul Stamnes	75 H. P.
Argo	50.4'	P. Nelson	75 H. P.
Arthur H.	72.8'	Egil Hansen	200 H. P.
Asta	40.0'	Mike Ness	45 H. P.
Atlantic	62.1'	John Gerde	75 H. P.
Atlas	58.5'	John Monson	65 H. P.
Attu	50.5'	P. Pettersen	125 H. P.
Bernice	50.7'	L. C. Sunde	65 H. P.
Bonanza	52.4'	R. A. Ringstad	75 H. P.
Brisk	59.8'	Amund Knutsen	90 H. P.
Constitution	64.0'	Ole Birkvold	135 H. P.
Daily	53.7'	C. M. Rolie	75 H. P.
Dawn	39.9'	Ed Halset	45 H. P.
Eastern	50.2'	I. Gelseth	50 H. P.
Eleanora	44.0'	Steen Pedersen	36 H. P.
Ethel S.	50.7'	R. Selset	75 H. P.
Excel	55.2'	John Molver	75 H. P.
Excell II	68.0'	Olaf Roald	160 H. P.
F. C. Hergert	55.8'	C. Svendsen	50 H. P.
Forward	47.5'	Sigurd Jacobsen	50 H. P.
Garland	40.0'	J. C. Bustness	45 H. P.
Garry Lee	40.1'	I. A. Garrison	60 H. P.
Gony	41.4'	Louis M. Reeland	45 H. P.
Grant	61.4'	Jacob Knutsen	100 H. P.
Hoover	56.8'	N. O. Ulvang	75 H. P.
Husky L.	36.8'	Paul Lee	45 H. P.
Ideal	47.0'	Ole Sether	45 H. P.
Ilene	59.0'	M. Madsen	90 H. P.
Ionic	53.6'	C. Erlandsen	75 H. P.
Irene J.	41.2'	Ingvald Jacobsen	60 H. P.
Jane	49.7'	P. H. Toft	50 H. P.
Kingfisher	57.0'	Howard Giske	75 H. P.
Lane	41.6'	Rasmus Kvinge	45 H. P.
Lindy	70.4'	P. P. Sather	150 H. P.
Lituya	58.0'	H. Jensen	65 H. P.
Magnolia	56.0'	H. Nordness	65 H. P.
Majestic	60.4'	Carl Abrahamsen	65 H. P.
Mariner	49.7'	B. H. Flaaten	65 H. P.
Middleton	48.4'	G. M. Isaacson	65 H. P.
National	51.4'	Ole Arseth	65 H. P.
Neptune	57.4'	H. Giske	100 H. P.
Norrona	49.1'	Emil Nilsin	65 H. P.
Northern	66.5'	Arne Larsen	170 H. P.
Omaney	66.5'	J. Courage	135 H. P.
Orbit	49.3'	Alfred Jangard	50 H. P.
Pierce	37.9'	N. M. Nilsen	45 H. P.
Pioneer III	49.8'	Edvin Eliasen	75 H. P.
Polaris	76.0'	Arne Einmo	170 H. P.
Resolute	66.1'	Jacob Bassi	110 H. P.
Selma J.	40.8'	Knute Rodal	45 H. P.
Sentinel	47.6'	L. P. Sunderland	65 H. P.
Sitka	73.0'	Wm. Doucett	110 H. P.
Sonja	57.0'	Chris Nelson	75 H. P.
Spray	49.0'	William Selset	75 H. P.
Sunde	72.7'	Egill Eriksen	180 H. P.
Sunset	59.8'	Carl Johannesen	100 H. P.
Superior	55.9'	Nels Forde	75 H. P.
Swift II	44.6'	Konrad Uri	60 H. P.
Tacoma	54.4'	A. Nelson	100 H. P.
Tillikum	47.0'	Alfred Vikan	65 H. P.
Tongass	61.7'	Nels Stangvik	100 H. P.
Tordenskjold	62.5'	Carl Serwold	100 H. P.
Tuscan	46.0'	A. W. Angellsen	50 H. P.
Visit	39.8'	Alfred Skeg. and P. Aspen	45 H. P.
Wenterstad	40.0'	Neil Burton	45 H. P.
Western	62.4'	George Eliasen	75 H. P.
Wizard	65.6'	Peder H. Jorgensen	110 H. P.
Woodrow	48.3'	J. Mickalsen	50 H. P.
Zarembo	41.1'	P. K. Sather	50 H. P.



ON the Atlantic, Gulf and Pacific Coasts are many privately owned fleets of work boats and fishing boats, comprising from five to twenty-five vessels—all powered by Atlas Diesels. In these individually owned fleets the preference for Atlas Diesels is often the judgment of the man who writes the checks. Sometimes the choice of a small group of men.

In the Seattle Halibut Fleet we find an aggregation of individually owned fishing boats which constitutes one of the largest Atlas Diesel powered fleets afloat. Among the owners of 174 Diesel and Oil Engine powered boats there are bound to be differences of opinion as to boat designs and power plants.

Boat designs fall into two classes which are illustrated at the righ "Seatt ventional p ner, w fish hold a ilot h schooners, hold type. Wit e two size, but in ass the

In this fle 74 hal makes of D d Oil powering s, Atl The neares titor 3 to 1 favo tlas po ber of boat six lea —which m tlas a 6 proves tha ty Mi Wrong!"

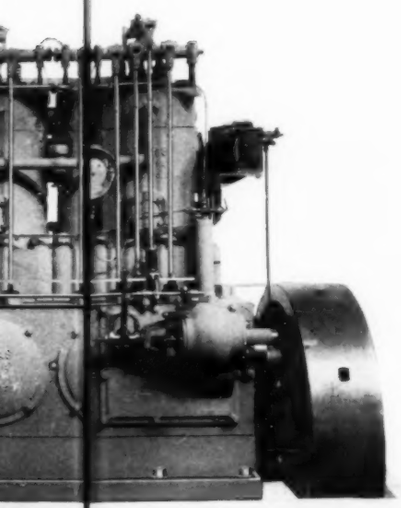
ATLAS IMPERIAL DIESEL ENGI COMI

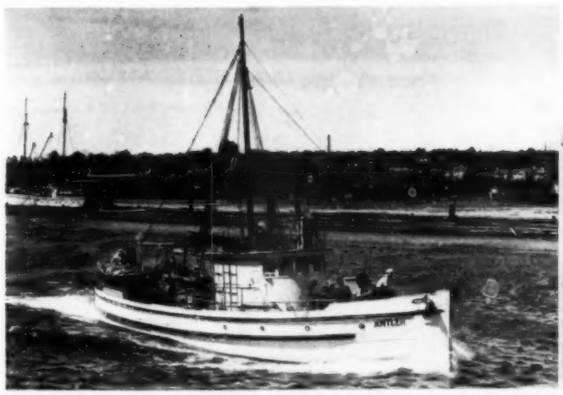
Eastern Division	*Central Division*	W
115 BROAD STREET, NEW YORK, N. Y.	228 NO. LASALLE STREET, CHICAGO, ILLINOIS	1000 NI OAKL

Gloucester—Providence—Philadelphia—Baltimore—Charleston—Miami—Jacks rpon Spr
Fort Worth—Houston—El Paso—Terminal Island—Seattle—Portland—Va Ketchikan—

ATLAS IMP R

y of Pacific Coast Halibuters





he righ "Seattle Type" resembles the con-
tional p ner, with pilot house forward and
hold a pilot house. The two mast halibut
oners, w hold forward, constitute the second
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, but in ass the boats run true to form.

this fle 74 halibut boats, thirteen different
es of D d Oil Engines are represented. In
ering 7 s, Atlas is the undisputed leader.
neares etitor powered 25—making Atlas a
1 favo tlas powered exactly the same num-
of boat six leading competitors put together
hich m las a 6 to 1 favorite. All of which
es tha ty Million Frenchmen Can't Be
ng!"

ENGI COMPANY

Western Division
1000 NINETEENTH AVENUE
OAKLAND, CALIFORNIA

REET,
IS

ni—Jacks rpon Springs—New Orleans
land—Van Ketchikan—Honolulu—Manila

P RIAL

SALEM, MISSOURI, DIESEL PLANT

By ORVILLE ADAMS *and* R. D. CAMPBELL

THE installation of the fourth Diesel in the Salem, Missouri, municipal plant, completed in September, this year, marked the tenth year of municipal operation in this city. When the utility company franchise expired in 1928, the citizens of Salem had already decided to build their own plant, and make it pay its own way: a sizable undertaking in the days before government grants were available.

Located amongst a number of national forests in the foothills of the Ozarks, on State Highway 72, Salem, the County seat of Dent County, is a Mecca for tourists to whom this region is known as the "Gateway to the Ozarks," and whose citizens are the pioneer American type with a progressive, modern outlook. In such a setting, it is quite natural to find a municipal Diesel plant and other civic projects being developed along very definite and effective lines.

Accordingly a bond issue was voted in 1928 for the construction of a power plant building and distribution system, while the engines, generators, and plant equipment were purchased with revenue bonds issued against earnings.

The original installation consisted of one 180 hp. and one 240 hp. Fairbanks-Morse Diesel engines, which went into operation on October 24, 1929. The utility at once removed its lines from the street and discontinued its service. In the first few years, however, operation was considerably handicapped by various forms of injunctions and litigations instigated by the utilities, which continued to harrass the venture long after the franchise had expired, no legal basis existing to justify such action.

This, together with the continued success enjoyed by the plant from the outset, tended to weld the public sentiment in support of the plant, with the result that the bonds were retired as they matured, and the machinery was paid for out of revenue in a period of five years. Power requirements increased, and additional units were needed by this time. In June, 1936, a 375 hp. Fairbanks-Morse model 32-E engine was installed and, at the same time, the 240 hp. engine was completely modernized by the addition of the new type back-flow cylinders, needle roller bearings in the wrist pins and the installation of a Woodward Isochronous governor. While this modernization did not increase the horsepower rating of the engine, it did result in an increase in the reserve power of the unit, and improved the efficiency and lowered the fuel consumption, as shown by the operating records.

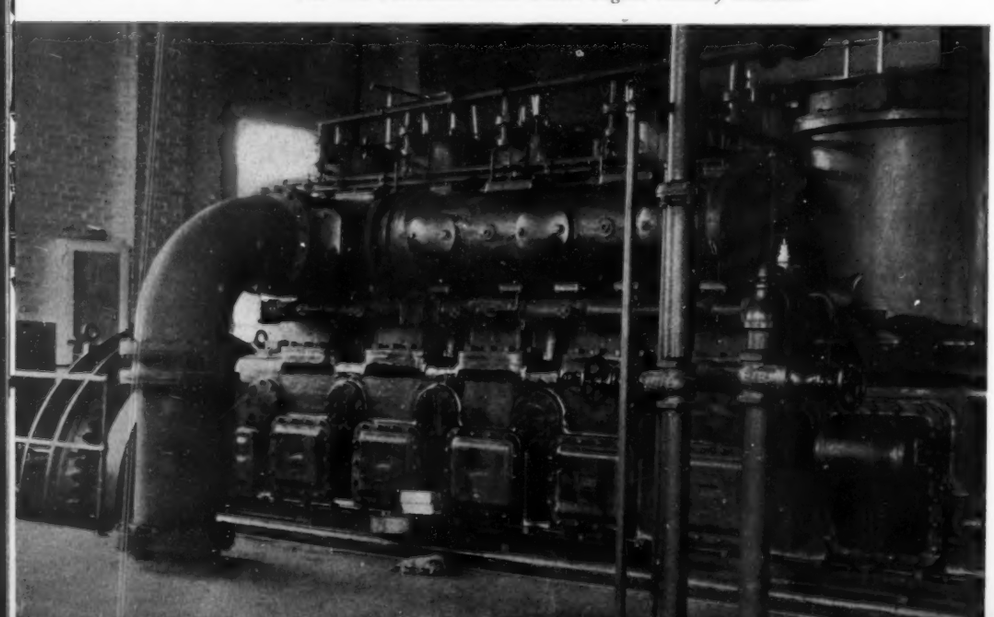
The plant now serves an R.E.A. system of 142 miles of lines to which are connected 450 customers in the rural area. This, together with the normal growth of the system in the city and the prospective increase in the rural business, made it necessary to install additional plant capacity this year, and a 575 hp. Fairbanks Diesel generating unit was purchased in July, installed in August, and went into service early in September. The new installation made it necessary to construct additional housing capacity. This new section of the building is the basement type, in which the heat exchanger, circulating water pumps, clean and dirty oil tanks, the day fuel tanks and pumps are located, and every detail of the installation meets the standard engineering requirements.

The plant equipment consists of one 180 hp. 3 cylinder, Fairbanks-Morse Diesel engine direct connected to a 150 kva., 3 phase generator with direct connected exciter. This unit is rated at 115 kw. Also one 240 hp. 4 cylinder Fairbanks-Morse Diesel engine direct connected to a 200 kva., 3 phase alternator and DC exciter. This unit is rated at 155 kw. but since it has been modernized, it is actually capable of a much higher output.

The 375 hp. 5 cylinder Fairbanks-Morse engine installed in 1936, rated at 250 kw., is direct connected to a 312 kva. alternator and exciter. All the electrical equipment is the 60 cycle 3 phase, 2,300 volt standard, and manufactured by Fairbanks-Morse & Company.

The new engine represents the latest in this type of design. It is also a 5 cylinder engine, rated at 575 hp. and is direct connected to a 490 kva. alternator having a V-belt driven type exciter. This unit is rated at 392 kw., and is fully equipped with essential auxiliaries.

The new Fairbanks-Morse Diesel engine recently installed.



The two recent installations were equipped with Woodward governors as standard equipment, while the 240 hp. engine was changed over to this type of governor in 1936. According to the operators, this governor equipment insures accurate control of the current frequency, and permits the equalization of the load between any two units or among all three of them, as occasion demands.

With each engine there is an overhead trolley for a spur-chained hoist mounted on a suitable I-beam rail. These rails are located directly over the center line of the engines to facilitate the servicing and inspection when required.

As an indication of the growth and development of this outstanding Diesel plant, the officials of the city released information as to the increase in the number of customers during the last three years.

Year	*1936*	*1937*	*1938**
Peak Load	265	345	420
Number of Customers'	1,016	1,123	1,175

*As of October, 1938.

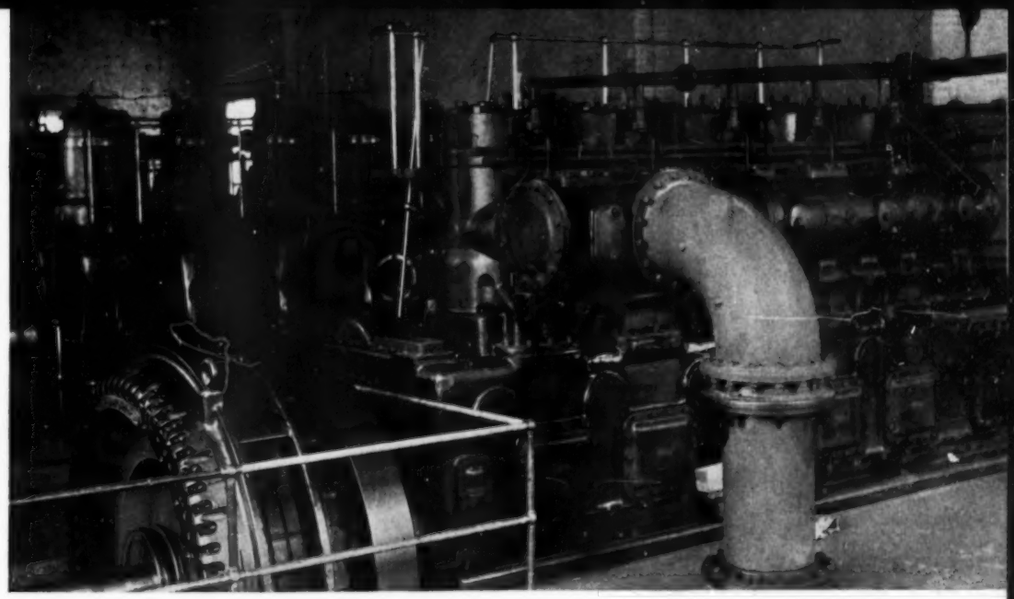
While the 1938 figure may increase above the estimated figures for this year, the number quoted is actually on the books. A brief summary of the financial status of this operation is shown in the following table also furnished.

Production Cost, fuel, labor, etc.	$10,567.09
Distribution, labor and materials	8,539.16
Maintenance, plant and lines	2,163.69
Total	$21,269.94
Total revenue	$42,203.27
Net	$20,933.33
Kwh. generated	1,248,900
Kwh. sold	835,787
Kwh. not sold	413,113

This last figure, representing the kilowatt hours generated but not sold, includes the line losses, power for the plant auxiliaries, and the power furnished to public buildings, schools, and street lights for which there is no charge made. The costs and revenues per kilowatt hour are quoted as follows:

Total production cost	.0085
Production and distribution	.0254
Revenue per kw. sold	.0505

The rates for service charged in Salem compare favorably with those in towns of similar population. The savings realized by the city and used for general purposes are also reflected in the modest tax rate of $1.20 per $100, based upon a 50 per cent valuation basis.



General view of the plant with new engine in foreground.

The city obtains its water supply from a well located in the pump room adjoining the engine room on the south side. Here the water is raised a height of 130 feet to the surface and pumped into the city mains and a standpipe having a head of 150 feet. The well installation comprises a Layne-Bowler, 9 stage, 10 inch deepwell pump driven by a 40 hp. vertical Fairbanks-Morse motor operating at 1,755 rpm. According to Dr. Slawson: "We have approved water supply from 2 wells, one located at the power plant, and one at the reservoir and high tower, this well being 710 feet deep and equipped with similar pumping equipment."

The power plant is located among a very beautiful grove of oak trees just across the street from the railroad. Just behind this plant is a well-kept croquet court well-lighted for night games. This spot is one of the most popular recreational facilities in the city, and is constantly used from early spring to late fall. While this project is not essentially a part of the municipal plant, it is made possible by cheap lights, and since the majority of the citizens are attracted to it, each one soon becomes interested in the adjacent Diesel plant as a result of this direct association with it, hence the croquet court has done its part in popularizing the Diesel plant.

The city officials respect public opinion, and they are in turn respected by it. They realize that a successful municipal plant is not the result of an accident.

In this, as well as in other cases, is found an enthusiastic and loyal citizenry supporting a competent leader and an efficient staff. The result is that the people of Salem are loyal to their plant, and to the Mayor, Dr. George H. Slawson, a civic-minded professional man, under whose leadership this plant came into existence, and grew to the present high state of success.

Having been elected mayor for six consecutive terms, Dr. Slawson has the support of the citizens who credit his vision and foresight for the success of their plant. Equally a factor in the development of this plant is the able Superintendent, Mr. E. J. Ueltzen, whose ability and experience contributes to economical operation and low cost for maintenance established by this plant as a record.

The plant and equipment, comprising all of the modern auxiliaries and necessary adjuncts to an adequate and complete protection of the machinery, consist of air filters, exhaust silencers, and pyrometers for measuring the exhaust temperature. The lubrication oil from all the engines is regularly filtered and cleaned. Fuel oil is stored in two storage tanks, having a capacity of 10,000 and 18,000 gallons, located in the grove adjacent to the plant. This adequate fuel oil storage capacity permits the city to take advantage of fluctuations in the price of its fuel oil, and insures a supply of fuel on hand to carry the plant over any emergency periods; such as floods, strikes, and other disasters which might intervene at some time.

In every feature of this plant, including the policy under which it is operated and administrated, there is evidence of good judgment, sound engineering, and foresight, the factors which in the long run determine the success of an enterprise of this kind. According to the officials, a great future awaits the small cities who learn how to operate their utilities, making the best use of the revenues derived.

One of New York's Fifth Avenue Diesel buses.

FIFTH AVENUE DIESEL BUSES

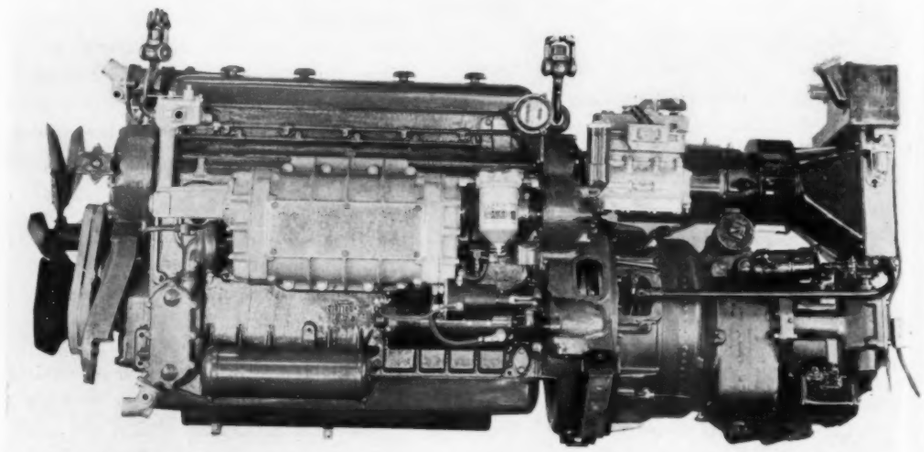
By GEORGE D. CROSSLEY

THE theme of a full page General Motors newspaper advertisement a few weeks back was "The Diesel Comes of Age"—well and truly spoken, the Diesel has come of age and has come into its heritage. This is well typified by the new Diesel buses operating up and down New York's Fifth Avenue and Chicago's Michigan Boulevard.

Illustrated above is one of the new Diesel driven buses as designed and built by the Yellow Truck & Manufacturing Company, a division of General Motors Corporation, for the company which operates the buses on Fifth Avenue, New York, and on Michicigan Avenue, Chicago.

One hundred and twenty-five Diesel buses just like this will be in service in New York and in Chicago by the time this issue reaches your desk, each powered with a six cylinder model 71 General Motors two cycle Diesel engine.

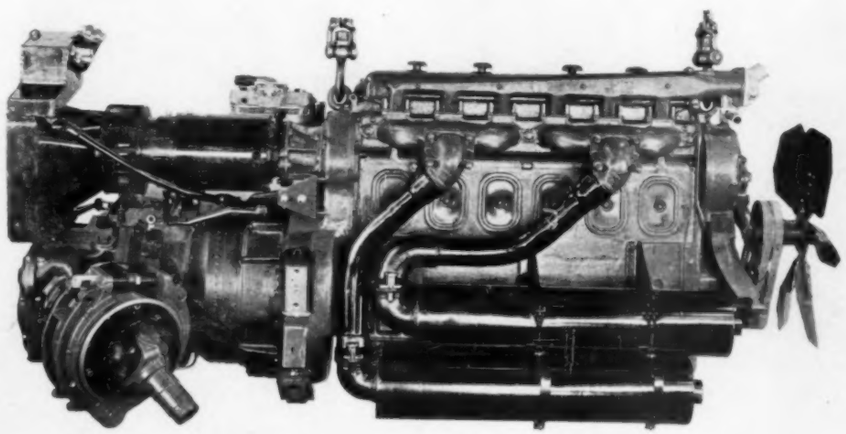
In addition to being Diesel powered buses, these one hundred and twenty-five units carry another distinguishing feature – they are all equipped with the Yellow Truck & Coach's new and exclusive hydraulic drive. This hydraulic transmission has a number of specific advantages: (1) There can be no jerky starts, the vehicle starts with a gliding motion. (2) Acceleration being perfectly smooth, passengers can walk up and down aisle safely. (3) Accelerator and brake pedals are only controls. All shifting is automatic. The driver's work is



Blower side 6-cylinder G.M. Diesel engine with hydraulic transmission attached as installed in bus illustrated above.

Rear view Public Service Coordinated Transport (Newark, N. J.) Diesel-electric bus. Yellow Truck & Coach delivered 125 of these Diesel buses to them last summer. Ninety-five equipped with 4-cylinder and thirty-five with 6-cylinder G.M. Diesels.

thereby reduced, giving him more time for safe operation of the vehicles. (4) There is a minimum time lag and consequent loss of acceleration as when changing gears in ordinary type transmission. With this hydraulic transmission acceleration is rapid and smooth. (5) Transmission is noiseless because no gears are used, thereby pleasing passengers and reducing maintenance costs normally encountered with geared drives. (6) Engine cannot be raced, the hydraulic system provides an absolute foolproof type of governor which stops the possibility of engine racing, thus eliminating the noise attendant on this bad practice and reducing engine wear. (7) Since the design of the friction clutch is such that engagement takes place under conditions of no load, repairs and renewals should be practically zero. (8) Efficiency losses due to oil churning, usually prevalent with gear drives, are eliminated. (9) Since the engine operates consistently at its most efficient speed, intermittent and fast engine acceleration and deceleration, so detrimental to engine life and economy, are eliminated. (10) Since the drive element consists in a fluid cushion, all propeller shaft vibrations are automatically damped out; a particularly important issue where Diesel engines are used. (11) The hydraulic transmission can be used as a dynamometer for a periodic check-up of the engine condition. The above advantages are briefed from a very interesting article on this new hydraulic drive which appeared in the September, 1938, issue of "Bus Transportation."



Exhaust side 6-cylinder G.M. Diesel direct-connected to hydraulic transmission as installed in New York's and Chicago's new Diesel buses.

GENERAL SEAFOODS ADDS TWO TRAWLERS

By GEORGE D. CROSSLEY

No better recommendation can be advanced for marine Diesel engines than repeat orders from owners who make a careful study of equipment under severe operating conditions. Approximately a year ago the Fore River Yard of the Bethlehem Steel Company delivered to General Seafoods three new Diesel trawlers of most modern design and construction. These ships were immediately placed in highly competitive operation between the Boston Fish Pier and the Grand Banks. The news that this organization has taken delivery of two more similar vessels is most conclusive proof of their successful and profitable operation. The first three will be remembered as the *Yale*, *West Point* and *Annapolis*, which were completely described in the December, 1937 issue of DIESEL PROGRESS. The new ships are called the *Harvard* and *Crest*, in accordance with the owners' policy of naming their boats after prominent universities.

Propulsion machinery in the new trawlers is the same as the three launched last year. The main engine is a 6-cylinder, 650 hp. Cooper-Bessemer, turning 260 rpm. Built-in auxiliary equipment includes salt and fresh water circulating pumps, lubricating oil pump and a Gardner-Denver air compressor. A 25 kw. Diehl generator is driven from the propeller shaft.

All engine exhaust lines are muffled by Maxim silencers, the main engine having in addition a dust collector unit installed.

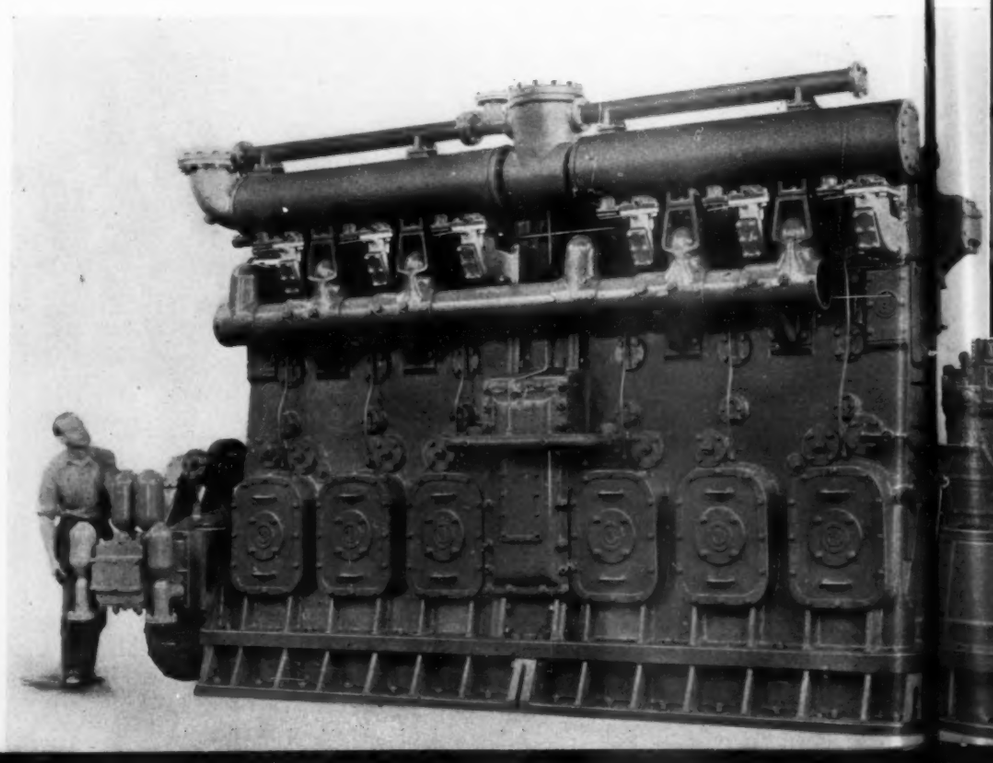
While a Kingsbury thrust bearing is used as before, it has been incorporated in the main engine housing. Certain improvements in piping result in greater engineroom simplicity and accessibility.

The trawl winch generator engine is again a 4-cylinder, 140 hp. Cooper-Bessemer with Diehl generator mounted on a common sub-base. This is in turn supported by Felters vibration dampeners which were added to the original designs. The electric-hydraulic steering gear is also new and permits much more rapid maneuvering under all conditions especially when "hauling back." A number of other improvements have been incorporated in fishing gear, fish storage and crew accommodations as a result of practical operating experience with the first three vessels.

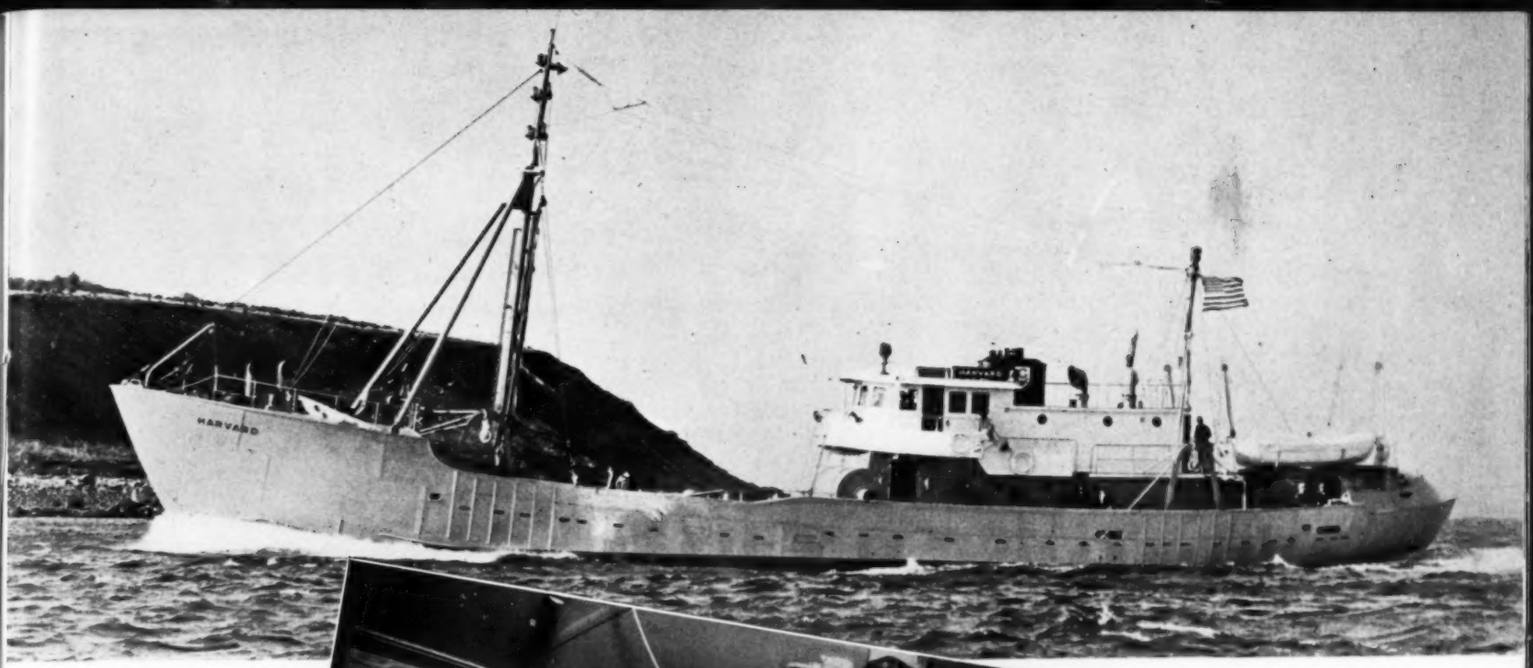
General hull lines remain the same as originally drawn by John G. Alden, Naval Architect, of Boston, in conjunction with The Maierform Corporation of America. These ships were found to be considerably more seaworthy than comparable vessels and are capable of greater speed with less power in both calm and heavy weather. In fact, they fish when others remain idle and have established new catch records while cutting running time by as much as 25 per cent. Since a trawler has no other purpose than to catch as many fish as possible and to deliver them in port as quickly and cheaply as possible the reasons for ordering more ships to these excellent original specifications are obvious. In this connection it is interesting to note that mechanical refrigeration which was installed as an experiment in the nickel-clad holds of the *Annapolis* proved so successful that it is being incorporated in all four sister ships. Each vessel has a capacity of approximately 300,000 pounds of fish and when fully loaded maintains a speed of 11 knots in all but extreme weather conditions.

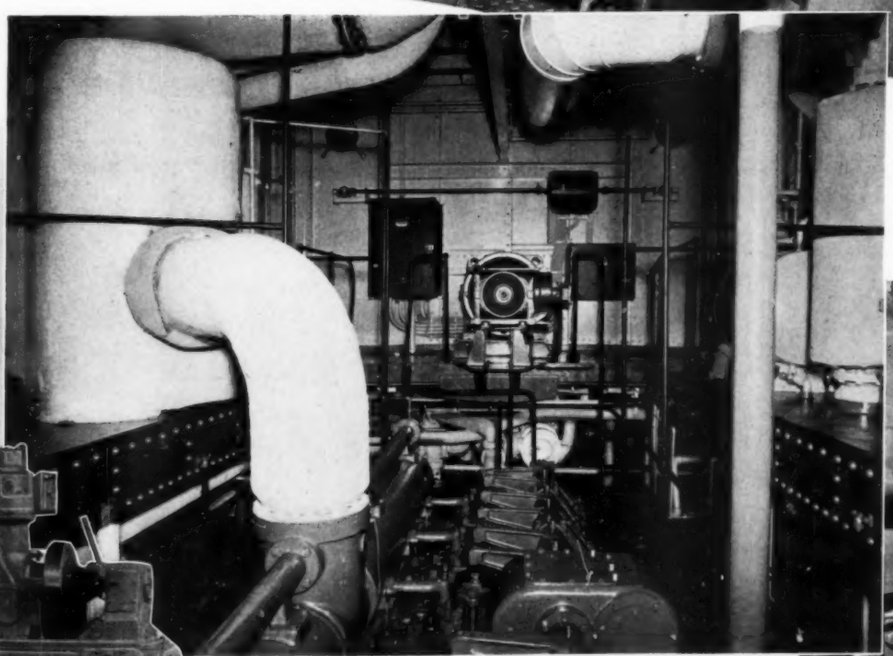
As emphasized in the previous article, the owners have paid particular attention to the comfort and working conditions of their crews. Since the men participate in the profits of their respective boats they are naturally interested in having the most efficient equipment most advantageously installed and to this end have supplied many of the suggestions which distinguish General Seafood trawlers from other vessels of this type. Diesel engines are popular in Boston and New England fishing circles but nowhere more popular than with the crews of this famous fleet. Diesel economy supplies their living and, not infrequently, Diesel dependability saves their lives when others are "lost at sea."

In general, all electric generator and motor equipment is of Diehl manufacture. This includes the trawl winch generator and motor which are of special design to give maximum speed and flexibility of operation under all fishing conditions. The control for this equipment is by the Cutler Hammer Co. which also has furnished all other motor starting equipment for the ships. The trawl winch, fish hoist, gallows, frames, bollards, checker stanchions and other special fishing gear are furnished by the Bromfield Manufacturing Co.

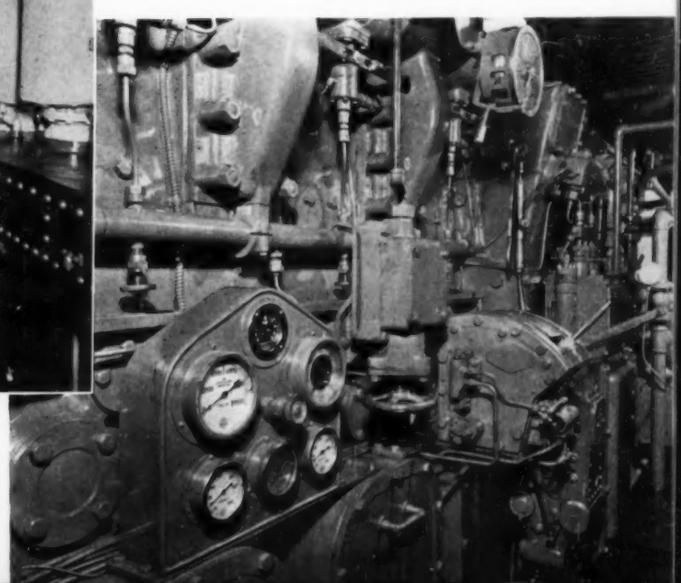


The main propulsion Cooper-Bessemer Diesel engine at the right proved so successful and economical in the "West Point", "Annapolis", and "Yale" that this model was again selected for the "Harvard" and "Crest".





The accompanying exterior and interior illustrations of the new Diesel Trawler "Harvard" show her complete similarity to the three vessels described by DIESEL PROGRESS *a year ago. Aside from minor design changes, these five ships are identical which simplifies greatly routine maintenance and cost.*



4400 HP DIESEL-ELECTRIC LOCOMOTIVE FOR RUMANIAN RAILWAYS

ONE of the recent major problems of the Rumanian Railways was to increase traffic capacity and, at the same time, reduce operating expenses between Bucharest and Brasov. This presented a number of serious difficulties since the part of the line between Campina and Brasov traverses mountainous terrain where three and sometimes four steam locomotives must be used to handle the extremely heavy international express trains. Naturally, under these circumstances, fuel consumption, crew wages and maintenance charges were unusually high in relation to traffic volume.

Extensive investigations were conducted along a number of possible solutions which included using other routes, electrification, more efficient and powerful steam locomotives and, finally, Diesel traction. All of these studies and calculations produced very interesting technical solutions but the substantial economy of Diesel locomotives was particularly outstanding. Thus it was decided to purchase one experimental unit for actual observation and testing in express train service. Sulzer Brothers, Ltd., of Winterthur, Switzerland, were commissioned to design and supervise the construction of this locomotive according to the following specifications:

1. Maximum load per axle, 20 tons.
2. Express operation over Bucharest-Brasov line with trailing weight of 600 tons.

The full meaning of the second stipulation will be better understood by referring to the profile or gradient chart of this line as shown

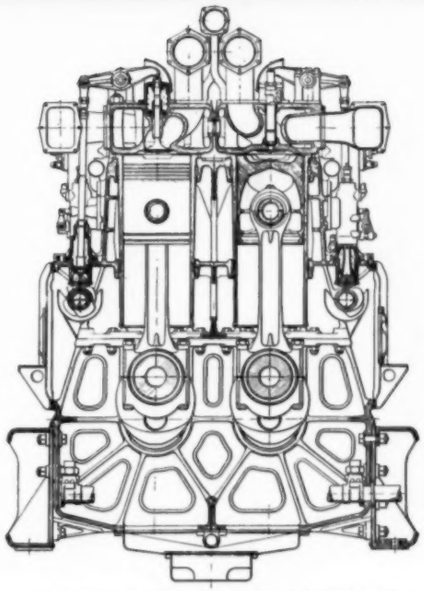
General view of the operator's cab and control station, which is almost yacht-like in its simplicity.

below. The average gradient on the 30-mile section between Campina and Predeal, on the southern slope, amounts to 1.3 per cent while that of the 16-mile section on the northern slope between Predeal and Brasov is 1.75 per cent. To make matters worse, curves are very numerous on all grades. A particularly difficult section of the line is the 6-mile run from Timisul de Sus to Predeal which has an almost continuous gradient of 2.5 per cent with exactly two-thirds of the distance in curves, the majority of which have a radius of only 900 feet. Since these curves are not compensated, it was necessary to add their resistance to the other tractive resistances when calculating the necessary tractive effort of the locomotive. Having thus stated one of the toughest problems ever assigned to Diesel manufacturers, let us investigate how it was solved successfully.

The accompanying illutration shows clearly the general construction and machinery layout. The following list of specifications will serve to complete a fair impression of this locomotive's enormous size and power:

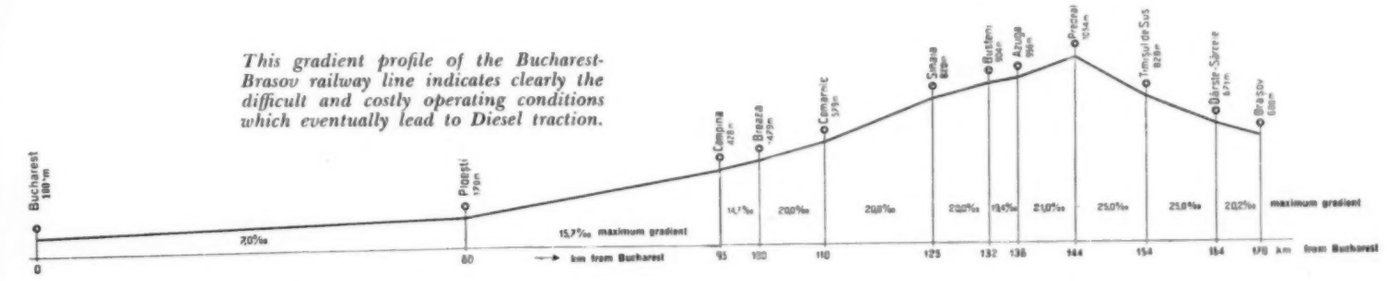
Length over all	96′ 0″
Breadth of body	9′ 10″
Height above rail level	14′ 8″
Driving wheel diameter	4′ 5″
Maximum tractive effort	79,200 lbs.
Total service weight	230 tons
Diesel engine horsepower	4,400

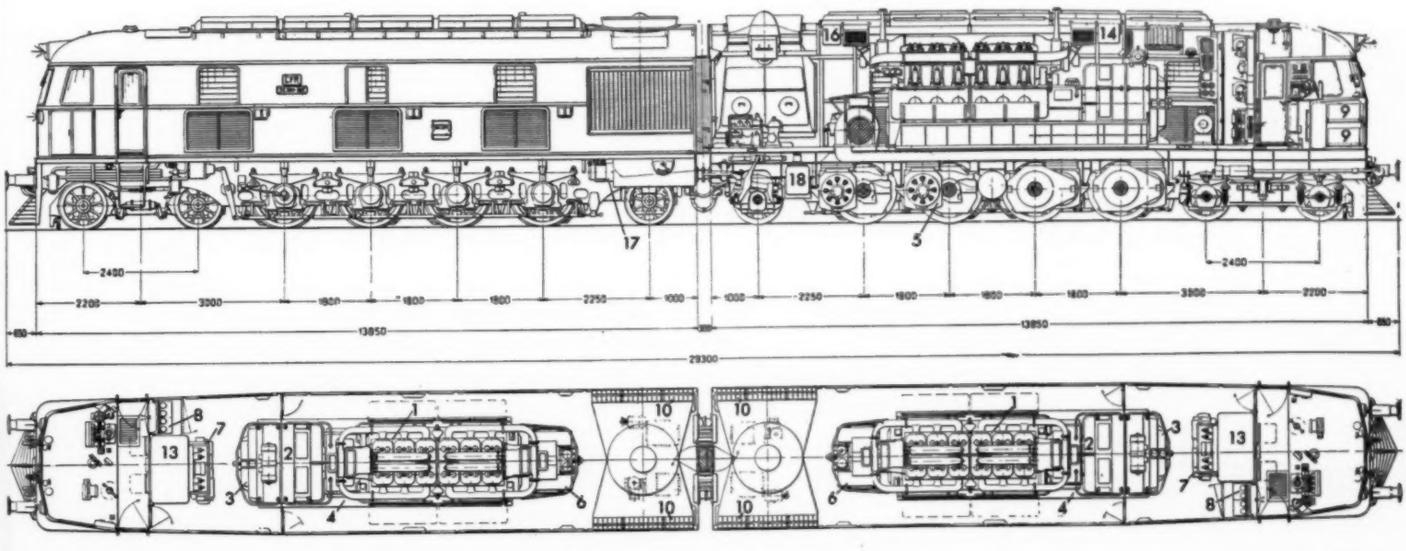
Due to the high power required by service conditions and the necessity of providing 16 driving wheels to obtain the requisite high tractive effort, it was necessary to divide the unit into two parts. The question then arose whether to make double units which could be used in-



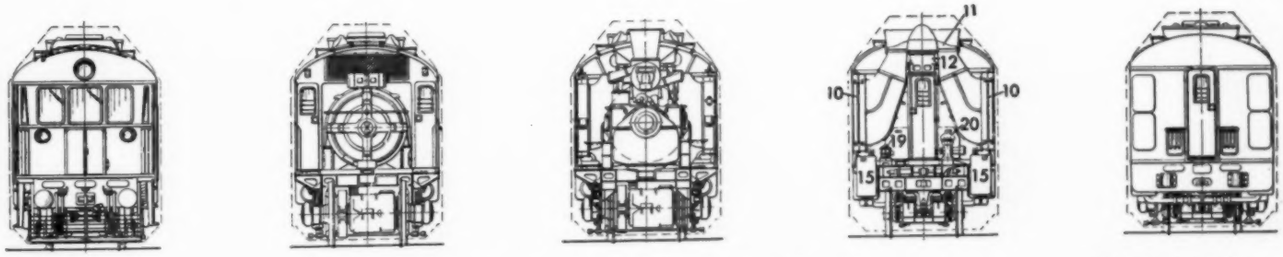
Transverse section of the Sulzer Diesel which shows the double crankshaft construction and parallel cylinder banks.

This gradient profile of the Bucharest-Brasov railway line indicates clearly the difficult and costly operating conditions which eventually lead to Diesel traction.



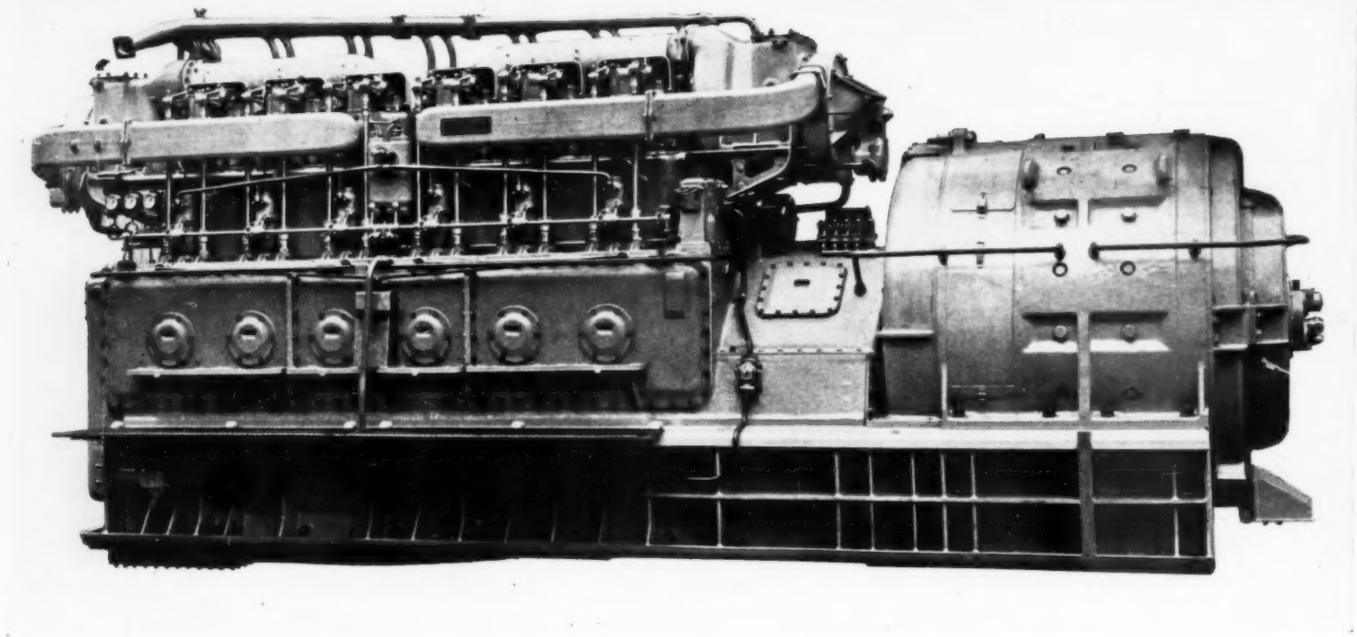


SULZER



1 Diesel engines
2 Main generators
3 Auxiliary dynamos
4 Auxiliary frame
5 Traction motors
6 Fans of traction motors
7 Air compressors for brakes
8 Electric apparatus
9 Starting battery
10 Water and oil coolers
11 Fans for coolers
12 Motors for fans 11
13 Main fuel tanks
14 Service fuel tanks
15 Main water tanks
16 Service water tanks
17 Cooling-water pumps
18 Lubricating oil tanks
19 Lubricating oil pumps
20 Oil separators

Elevation, plan and sections of the 4400-B.H.P. Diesel-electric locomotive for the Rumanian Railways.



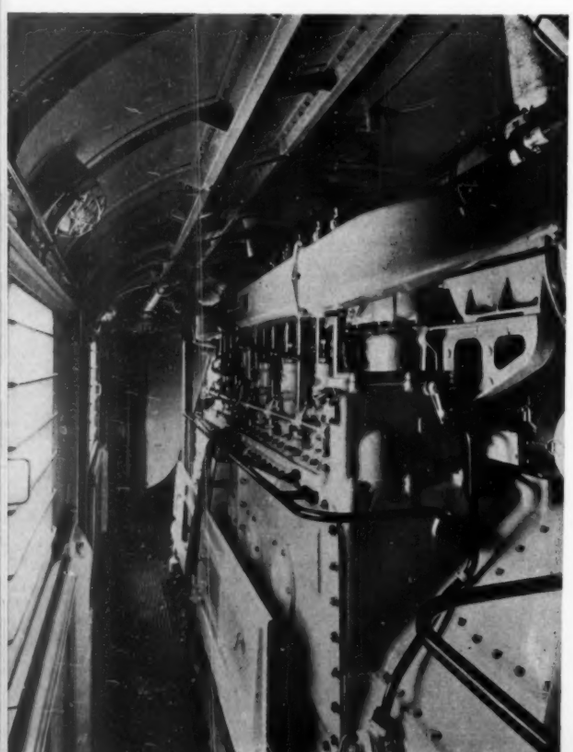
Factory view of the Sulzer Diesel generator set as installed in duplicate on the Rumanian Railways' new express locomotive. Each unit supplies 2,200 hp. at 700 rpm.

dependently if desired or to couple the halves permanently as one. The latter choice was selected due to the substantial saving in length, weight and cost from the elimination of one driver's cab and sundry auxiliary equipment which would otherwise have been necessary in duplicate for the two main engines separately. However, the two parts were built exactly alike with the above exceptions so that separate halves would be interchangeable when more such locomotives are acquired in the future.

The two Sulzer Diesels are set in tandem and develop 2,200 hp. each at 700 rpm. They are of the 4-cycle, solid injection type with twelve cylinders each, arranged in parallel banks of six, and supercharged by the Buchi system. Perhaps the most distinctive feature of these engines is the arrangement of two crankshafts in one common casing, with the generator driven from them through toothed-wheel gears. Such design has a number of important advantages: Maximum power output can be concentrated in one engine which reduces the number required with resultant simplification of controls. The width available in the locomotive can be utilized more fully, particularly since the generator has approximately the same breadth as the twin bank Diesel. The length is thus correspondingly reduced. The gear drive permits setting the engine as low as possible in the locomotive frame which reduces height with no sacrifice of accessibility to cylinder heads for inspection or routine maintenance.

The crankcase consists of two cast-steel pieces welded together and carries an extension for the gear bearings. Lubricating oil is led to the main crank bearings from below through passages drilled in the crankcase ribs so that any risk of interruption in the lubricating oil flow is eliminated so far as possible.

Certain features of the locomotive's axle arrangement are worthy of note. The driving axles have no side play so, in order to give necessary facility in rounding curves, the wheel flanges of the second and third drivers are turned down by approximately five-eighths of an inch. The carrying truck may have a maximum displacement of between three and four inches at the pivot pin and the driving truck of one inch less towards both sides so that switches of 1 to 8 can be easily negotiated at low speeds. To assure smooth running in the straight there has been provided a suitable device for damping any tendency of the trucks to hunt. The single action driving trucks are of conventional design for this type service except that they have no actual pivot but only a theoretical one.



The above engine, shown at the left installed, makes most economical use of the available locomotive width with a corresponding saving in length.

The main frame of the locomotive is designed as an outer frame and is welded throughout. Main plates of the frame are of 1-inch stock with somewhat lighter transverse stiffening member of varying thickness according to position. The articulation between the two members of the unit is effected by means of the central draw-gear members and lateral buffers in accordance with standard requirements of the German State Railways.

The starting battery is located in front of the driver's cab, the corresponding space being closed and ventilated from outside. In the same room are two compressed air containers, each of 85 litres capacity. In addition to that, there are in the driver's cab, a wall-heating element, a foot-warming plate and a fan installed on the driver's table.

The main fuel tank is in the apparatus room; the water tanks are arranged under the coolers.

The locomotive is fitted with Knorr-Westinghouse compressed air brakes, i.e., an automatic and a regulating brake. The air is supplied from two motor compressors, each delivering 1,600 litres per minute. The automatic brake works on the driving wheels and on the truck, the regulating brake only on the driving wheels.

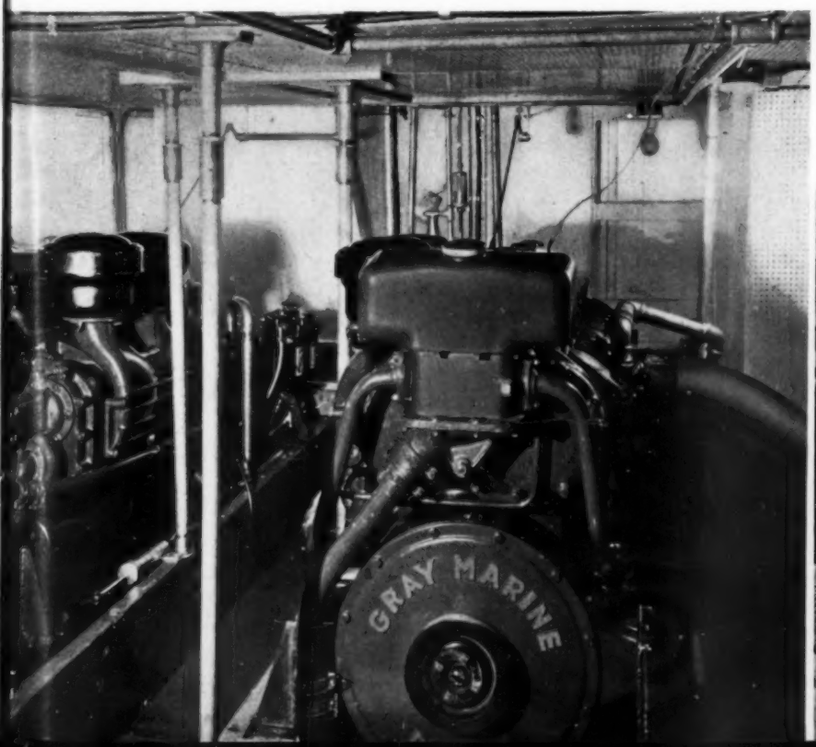
Sleek lines and plenty of power make "Barat" one of the fastest off-shore cruisers of her size to winter in Florida.

65′ DIESEL CRUISER "BARAT"

ONE of the season's most outstanding Diesel yachts is unquestionably Mr. Edward P. Hammond's *Barat* which will be active in Florida waters this winter. She has been in service on the Great Lakes since August and had ample opportunity to prove herself a very comfortable and satisfactory sea-going vessel before starting the long trip south via the Mississippi River and New Orleans. Main propulsion is furnished by a pair of opposite rotation Gray marine Diesels rated at 165 hp. each and fitted with 2:1 reduction gears. These engines are based on the Diesel developed and built by General Motors and are adapted and equipped for marine service by Gray. With her two Michigan Aquamaster propellers turning at 1,920 rpm. the *Barat* has a top speed of 16 miles per hour. Normal cruising speed is approximately 14.5 mph. at 1,650 rpm., at which fuel consumption is the remarkably low figure of one gallon per mile. With such impressive operating economy plus the elimination of fuel fire and explosion hazards it is obvious why modern yachtsmen insist upon Diesel engines.

Barat is 65 ft. overall with a 15 ft. 6 in. beam and 4 ft. draft. She is of heavy construction throughout with Everdur-fastened mahogany planking on oak frames. Decks and deckhouse are also mahogany. Natural finish teak trim adds much to her conservatively attractive external appearance.

Interior arrangement provides for crew's quarters forward with toilet and shower. The captain's stateroom is immediately aft with access to both through the deck scuttle hatch. Next is a spacious, well equipped galley extending the entire width of the boat and fitted with stainless steel. A serving door leads to the deckhouse. Slide type windows with roll screen and venetian blinds make this a particularly pleasant lounge and dining saloon. A companionway leads to the after cabin which comprises two guest staterooms, owner's quarters, lavatories and lockers. The vessel is well insulated and practically sound-proof. Two 380-gallon fuel tanks provide a cruising range of from 750 to 1,000 miles depending upon speed.

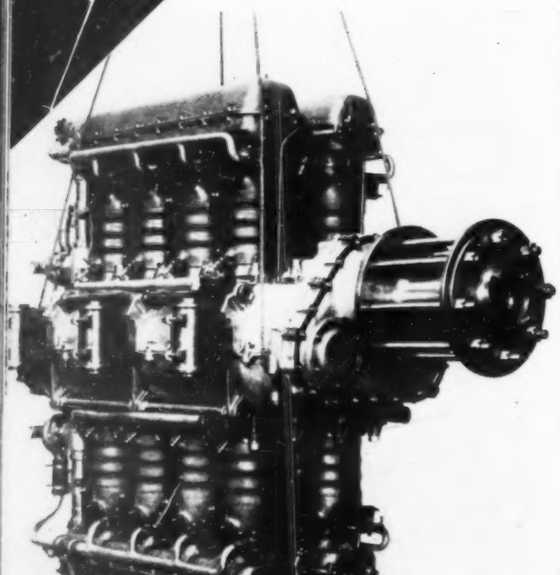


Plenty of room and excellent ventilation are found in the engine compartment as well as the owner's quarters as these two views indicate.

DIESEL AVIATION

JALBERT-LOIRE DIESELS

By PAUL H. WILKINSON



The new Jalbert-Loire sixteen-cylinder aircraft Diesel which is now undergoing its tests in France.

ANOTHER new Diesel aircraft engine was disclosed at the recent Aero Show in Paris. On the stand of the well-known firm of Ateliers & Chantiers de la Loire, was exhibited the four-cylinder, water-cooled, Jalbert-Loire engine. Although it was also intended that their new sixteen-cylinder engine should be exhibited, this was not possible due to the fact that it was undergoing its tests for the Air Ministry.

The first Diesel aircraft engine designed by M. Jalbert, was completed as long ago as 1932. It was of six-cylinder construction, with its cylinders arranged in-line above the crankcase. This engine had a bore and stroke of 4.92 in. and 7.09 in. respectively, and a displacement of 809 cu. in. It had a maximum power output of 235 hp., and weighed 838 lb., or 3.55 lb. per hp.

The next engine, which was completed in 1936, was of four-cylinder construction with its cylinders below the crankcase in accordance with accepted aircraft engine practice. A change was made in the cylinder dimensions so that the bore and stroke were "square" or of the same dimensions, namely, 5.12 in. This engine had a displacement of 422 cu. in. and a maximum power output of 160 hp. at 2,460 rpm. As it weighed 390 lb., it had a specific weight of 2.44 lb. per hp.

The four-cylinder engine had a frontal area of 4.52 sq. ft., a compression ratio of 13:1, and a fuel consumption of 0.39 lb. per hp. per hour. This low fuel consumption was quite an achievement for such a small engine. The illustration shows the engine equipped with an Eclipse electric starter which proved adequate for starting it on all occasions.

When the sixteen-cylinder, "H" type engine came to be built, M. Jalbert based its design upon the four-cylinder engine. Virtually, the larger engine consists of four of the smaller engines. The "H" engine has the same bore and stroke as the smaller engine, and its displacement is 1,688 cu. in. Its maximum power output is 600 hp. at 2,400 rpm., and as it weighs 1,235 lb., it has a specific weight of 2.06 lb. per hp. Its compression ratio is also 13:1, which is unusually low for a high-speed Diesel. It runs on ordinary Diesel fuel of 0.850 specific gravity.

In construction, the engine comprises two parallel units, each with eight cylinders in the vertical plane. Each unit has two banks of opposed cylinders, while the two crankshafts are coupled to the propeller shaft by reduction gearing at the front of the engine. Firing takes place alternately in each bank of cylinders.

The crankcase is made of aluminum alloy, with an upper and a lower portion held together by the same through bolts that are used for securing opposite pairs of cylinders to it. On the front of the crankcase, is an aluminum alloy housing for the reduction gear, while at the rear there is another housing of the same material to which the starter and the electric generator are attached.

Longitudinal rigidity of the crankcase is obtained by means of four heavy-gauge steel tubes parallel with the four banks of cylinders. The tubes are attached to lugs at the front and rear ends of the crankcase, and to lugs midway between these points. Additional rigidity is obtained from the through bolts which hold the two portions of the crankcase together. These through bolts have specially shaped steel straps at each end which secure the flanges of the cylinders to the crankcase at four equidistant points.

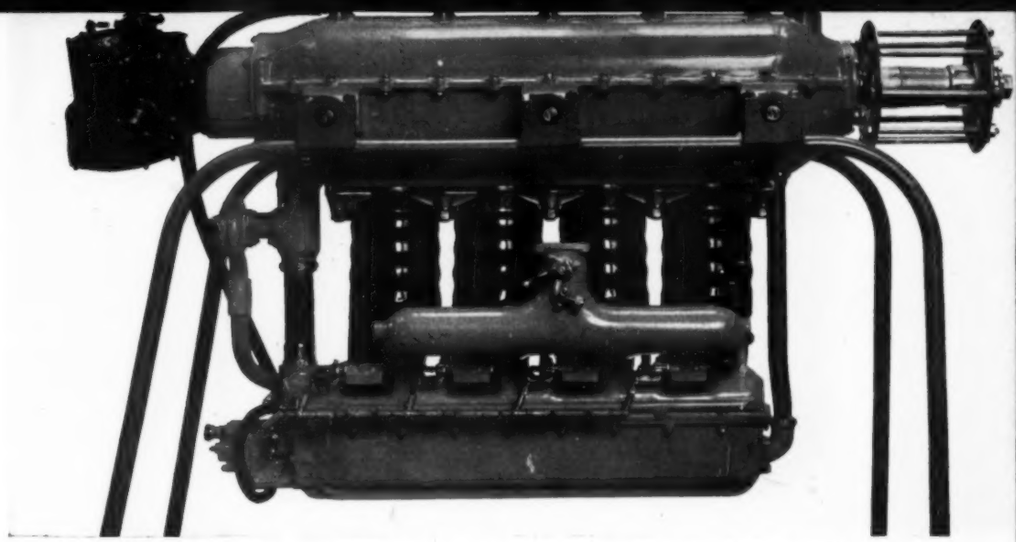
This construction is particularly interesting, inasmuch as cylinder stresses are transmitted to the steel bolts which are of ample predetermined strength for the duty they have to perform. As the crankcase is merely held in compression, it is not subjected to alternating stresses as are most aircraft engine crankcases where the cylinder flanges are attached with studs and nuts.

The sixteen individual cylinder barrels have corrugated steel water jackets welded to them. The crankshafts are of the four-throw type, and each one is supported in five lead-bronze bearings of ample dimensions. The front end of each crankshaft carries a spur gear wheel which transmits the drive to a larger gear wheel on the inner end of the propeller shaft. The rear ends of the crankshafts are connected through spur gear wheels to a common gear wheel which carries the clutch jaw for the starter.

The connecting rods are of H-section, and for each pair of opposed cylinders, one rod has a plain and the other a forked big-end, with lead-bronze bearings between them. The pistons are made of aluminum alloy, and have three compression rings above the piston pin and one oil scraper ring below it. The piston pins are of the fixed type.

Overhead camshafts are provided for each of the four banks of cylinders. The camshafts are driven at one-half crankshaft speed through bevel gears and tubular vertical shafts located at the rear of each bank of cylinders. Each cylinder has one inlet valve and one exhaust valve mounted in the cylinder head where they are actuated by the camshaft. The camshaft itself is unique, in that in addition to the cams for the valves, it has small throws like a crankshaft. To each of these throws, is attached a small tubular steel connecting rod which operates a small piston in the special fuel injector attached to the top of each cylinder head.

The fuel injection system, which is one of the



The 160 hp. 4-cylinder Jalbert Diesel which was exhibited at the Paris Aero Show in 1938.

features of the engine, is designed in accordance with Mr. Jalbert's patents for the pre-compression of the fuel mixture before it is admitted to the cylinder of the engine. The combined fuel mixture compressor and injector valve, which is known as the injector, is located on top of the cylinder head. Fuel and air are mixed and compressed in a small cylinder in this unit by a piston operated from the camshaft, and then the compressed mixture is forced through a spring-loaded injector valve into the combustion chamber in the cylinder. It is due to this pre-compression of the fuel mixture, that a lower compression ratio can be used in the Jalbert-Loire Diesel than in other aircraft Diesels.

The lubrication system employed on the engine, comprises a vane-type pressure pump at the rear of the lower portion of the crankcase for supplying the lubricating oil to the various moving parts of the engine, and two duplex gear-type pumps in the bottom of the crankcase for scavenging. A separate vane-type pump is used to return the oil to the service tank.

Each bank of cylinders has its own cooling system, with a small centrifugal-type pump mounted on the rear of each bank where it is driven through bevel gears from the vertical camshaft drive shaft. The pumps supply water to intakes in the cylinder heads, while the outlets are at the inner ends of the cylinder water jackets. The outlets from all four banks are connected to a radiator for cooling, and the water is then returned to the suction side of the pumps.

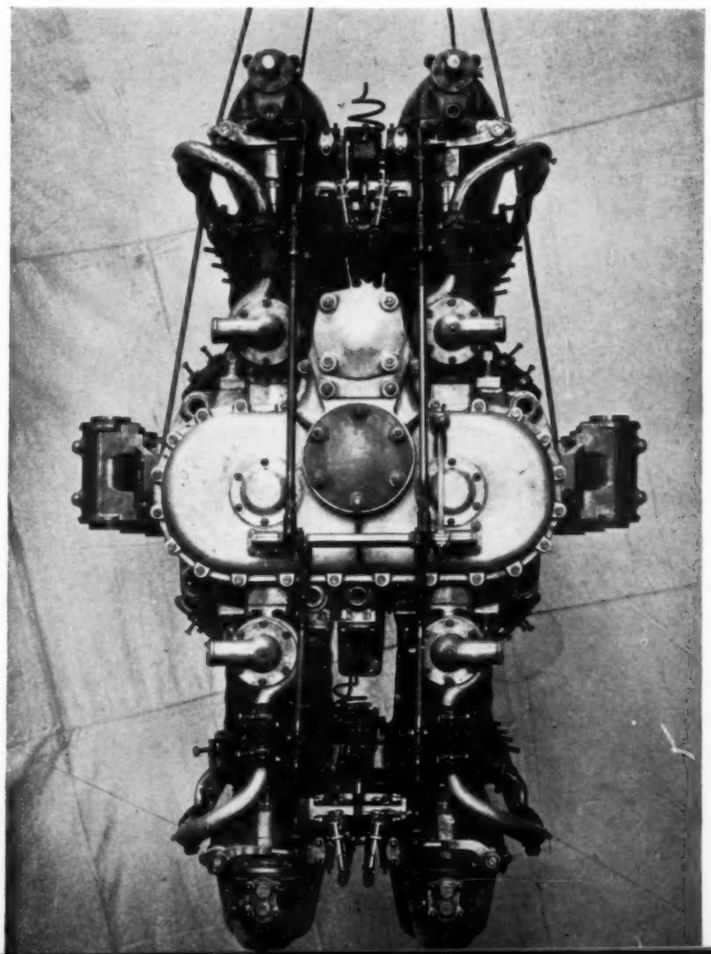
An Eclipse electric inertia starter is used for starting the engine. The starter is mounted on the rear housing where it engages with the central gear wheel meshing with spur gear wheels on the rear ends of the crankshafts. A decompressor system is fitted to the exhaust valves whereby they can all be opened simultaneously to aid in starting the engine from cold.

The Jalbert-Loire "H" type aircraft Diesel certainly is a novel engine. Its flight tests will be awaited with great interest, inasmuch as it resembles in its cylinder arrangement, a type of engine that has already met with success in the gasoline aircraft engine field. Its low frontal area of 8.41 sq. ft., is definitely in its favor, while its specific weight is reasonable considering that it is not yet equipped with a supercharger. The addition of the latter should boost the power output to approximately 800 hp., which will make it an attractive aircraft power plant for many purposes.

It is understood that M. Jalbert is preparing designs for still more powerful aircraft Diesels based on his "H" type engine. One design calls for a engine with twenty-four small cylinders arranged in four banks, and a total displacement of approximately 1,400 cu. in. This engine would develop about 1,000 hp.

The fact that another Diesel aircraft engine has made its appearance in France, is significant. It shows the tremendous interest that is being taken in this type of power plant in Europe, and in time, these engines are bound to be successful inasmuch as they have adequate government aid behind them. What a contrast, is the position of the Diesel aircraft engine in the United States! Here, the government is so short-sighted in its policy of aircraft engine development that it overlooks the very type of engine that would be of tremendous value to the country for both civil and military aviation.

Recently, several well-known people in the aviation world, on their return to the United States from Europe, have been quite outspoken about our relative backwardness in aviation. In no particular field is this backwardness more pronounced, than in that of our Diesel aircraft engine development. Unless a change in policy occurs it is inevitable that our deficiency in this respect will increase year by year.



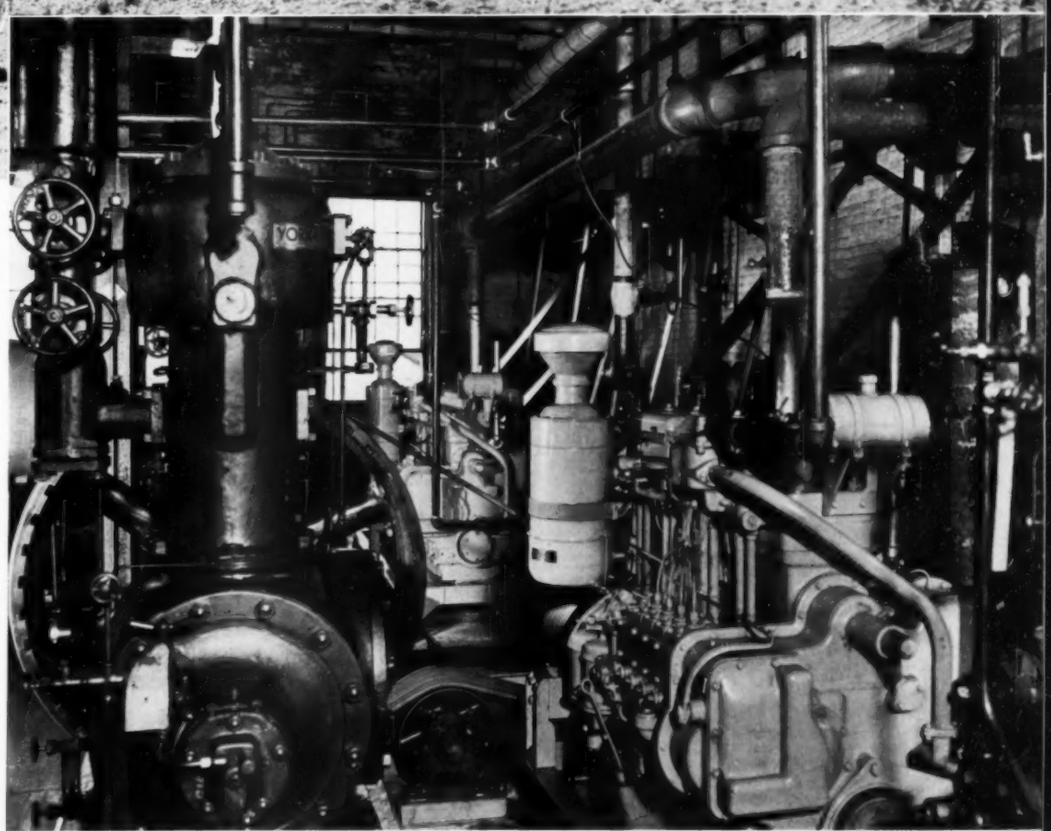
Rear view of the new 600 hp. "H" type aircraft Diesel, showing the four banks of water-cooled cylinders.

Above — Up from the Company's boats, which get their cargoes from more than sixty fish-wiers, tons and tons of Cape Cod whiting are carried daily into the plant by means of this tramway. At left — Waiting for shipment to all parts of the country, Pond Village's Cape Cod whiting are frozen in boxes and kept in the great cold storage rooms. A corner of one of these neat rooms is shown here. At right — From off of the tramway, fish are brought into the cleaning and packing room shown here. About one-tenth of an average day's catch is being handled in this picture.

DIESELS FREEZE FISH

OUT of waters that were among the first to be fished by white men in America, the Pond Village Cold Storage Company of North Truro, Mass., takes millions of pounds of fish yearly. From their cold storage rooms, famous Cape Cod whiting go out to all parts of the country as a recognized delicacy. Sometimes there are more than 2,000,000 pounds of these fish stored in the great rooms of the North Truro plant. To keep them fresh and palatable, temperatures of the freezing rooms must be constantly below zero degrees, and many times are maintained at eighteen below. Fish are caught in more than sixty weirs belonging to the company. They are brought up from the boats on tramways and sent directly to the cleaning room, where they are washed, cleaned and packed into boxes. Then they are carried into the freezing room, frozen under the very low temperatures, and stored while frozen until shipped. To keep the temperature steadily down, the company resorted to steam pressure for many years, but in May, 1938, installed two 4-cylinder Caterpillar Diesel engines. Each engine drives a York 9 x 9 compressor, a 250-gallon per minute water pump and a 300-gallon per minute brine pump.

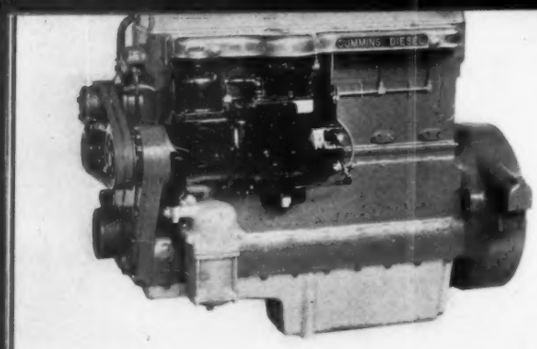
Each engine works 24 hours a day, with brief shutdowns for servicing, and each engine car-

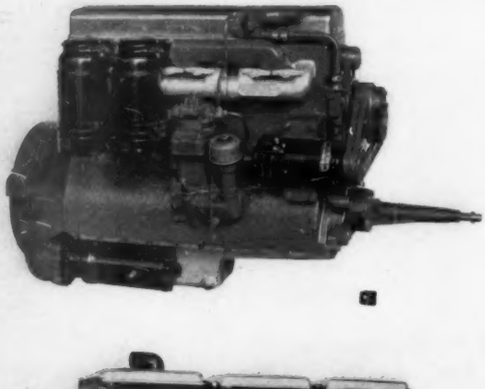


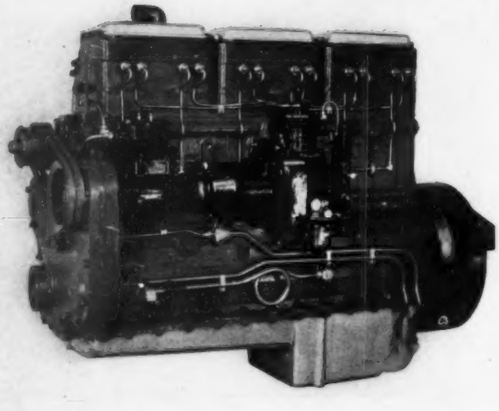
ries an average load of 57 hp. To maintain the required temperatures in the freezing and cold storage rooms, it takes eight gallons of 5.6c. fuel an hour. This is the average needed to keep both engines running steadily, hour after hour, for the 720 hours that each averages per month.

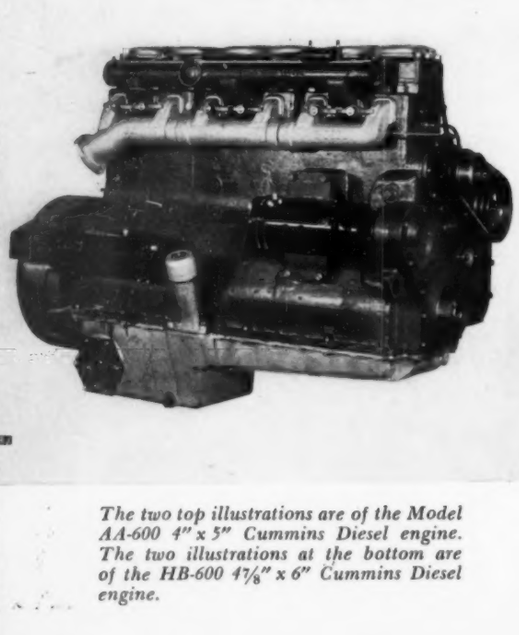
Leaving the steam plant idle, with the current low cost Diesel power substituted, by no means signifies that the expenditure for steam equipment will be wasted. Up until the present time, fish heads and other refuse from the cleaning and packing rooms has gone to waste, but current plans are underway by the company to put these materials to profitable use through the utilization of the steam equipment.

The boilers will be put to work again this winter, and thereafter will be the main element in a dehydrating plant which will turn the refuse into valuable and highly marketable fertilizer.









The two top illustrations are of the Model AA-600 4" x 5" Cummins Diesel engine. The two illustrations at the bottom are of the HB-600 4⅞" x 6" Cummins Diesel engine.

WHAT ABOUT CU

By GEORGE D. CROSSLEY

THE staccato announcements of new Diesel engines for truck and bus service at the recent Motor Truck Show have caused a lot of people within and without the industry to ask "What About Cummins?", so we made a quiet investigation, developing some very interesting information.

The sale of Cummins engines in 1938 substantially exceeded their sales in 1937, despite the fact that general business was off from 28 to 33 per cent. During the last seven years Cummins Engine Company has been compelled to enlarge their factory five times. They are at present building a new edifice which will house the assembly of the Cummins pump and injectors.

The Cummins Engine Company is at the present time supplying Diesel engines, either as original or optional equipment, for the following well-known truck and bus manufacturers: Autocar, Available, Corbitt, Dart, Euclid, Fageol, FWD, Hendrickson, Hug, International, Kenworth, Linn, Mack, Marmon-Herrington, Moreland, Oshkosh, Sterling, Walter, and White.

That, in brief, is the current situation with this well-known and popular engine builder. The net of the situation is that, despite the increased competition, Cummins will in all probability do an ever-increasing business, because the more competitors that come into the field, the more customers are created for Diesel trucks and Diesel buses and Cummins will get its share.

Of course, there is a reason for the favorable position in which the Cummins engine now finds itself in the truck and bus field. Cummins is in its twenty-second year of active work building nothing else but Diesel engines. For the first thirteen or fourteen years, they followed along conventional lines, using the standard practices of all other Diesel engine manufacturers. A number of engines were sold to the marine field and were popularly advertised as Cummins Oil Engines.

During all this time, "C. L." had continually in his mind the development of a practical high-speed, automotive engine. In 1930, he caused considerable excitement at the Automobile Show by driving the first Diesel-powered passenger car, a converted Packard, to the New York Show. In this car was installed the first model of the present "H" engine which has proved successful in trucks. Its principal feature was the development of a new type fuel pump; that is, a distributor pump operating under low pressure about 130 lb. and through this single pump, delivering a metered fuel charge to each cylinder in regular firing sequence, the same principle as the rotor in the present gas automobile.

In 1931, he again centered the interest of the country on the Diesel by entering a Cummins Diesel-powered racing car in the Indianapolis 500-mile Speedway Race. This car maintained a speed of 86.17 miles per hour and completed the entire run without a stop — the first non-stop record in the history of Speedway racing.

In 1931, under official A.A.A. tests, a Cummins Diesel-powered truck carrying 16,750 pounds was driven continuously, without stopping to re-fuel, for 10,005 miles. In 1932, a 32 passenger bus was driven from New York to Los Angeles, a total running time of 78 hours and ten minutes with a gross weight of 25,500 pounds, the fuel cost for the entire trip being $21.90.

At about this time (June, 1932), the first truck installation was made for the Purity Stores in San Francisco. It was watched with considerable interest by the truck operators on the Coast because here was an ideal set-up for the Diesel engine — long hauls, heavy grades, continuous operation. Soon after this, engines were installed in the Pacific Freight Lines of Los Angeles and the Consolidated Freight Lines of Portland. Then followed a rapid development and refinement of the engine based on field tests until, in 1938, a close check on all Diesels operating in long distance, heavy-duty hauling, showed a preference in actual installations of 98 per cent in favor of Cummins.

During this time, numerous tests were being made with the Model HB-4 and 6-cylinder engines in dump trucks and other short haul, heavy-duty work. Colonial Sand and Stone Company of New York City made a test of two in their trucks on operations where the gross mileage seldom exceeded 50 miles a day, and

UT CUMMINS?

during 1938 they decided on a complete Dieselization program in their heavy duty trucks. At the present time, they have 171 Cummins Diesels installed.

In a recent visit to the Cummins factory in Columbus, Indiana, telegrams were shown to us from large fleet operators out on the Pacific Coast claiming to be the first to operate a Diesel truck one million miles. Another telegram from an even larger fleet owner on the Coast stated in early November that they had completed 13,891,451 miles of Diesel powered truck performance to their complete satisfaction. In both cases all of the engines in these fleets were from the Cummins factory.

The present Cummins line of engines available for truck and bus operation consists of the Model AA Series, bore 4 in., stroke 5 in., and built in four and six cylinder models with a piston displacement of 251 and 377 respectively. The older and possibly better known model is the HB, bore 4⅞ in., stroke 6 in., likewise built in four and six cylinder units with a piston displacement of 448 and 672 cu. in. respectively. Thus Cummins now supplies for automotive service engines ranging in size from 66 hp. up to 150 hp., in addition to which, of course, they manufacture a sizable range of Cummins engines for industrial, marine, and other applications ranging in size up to 500 hp

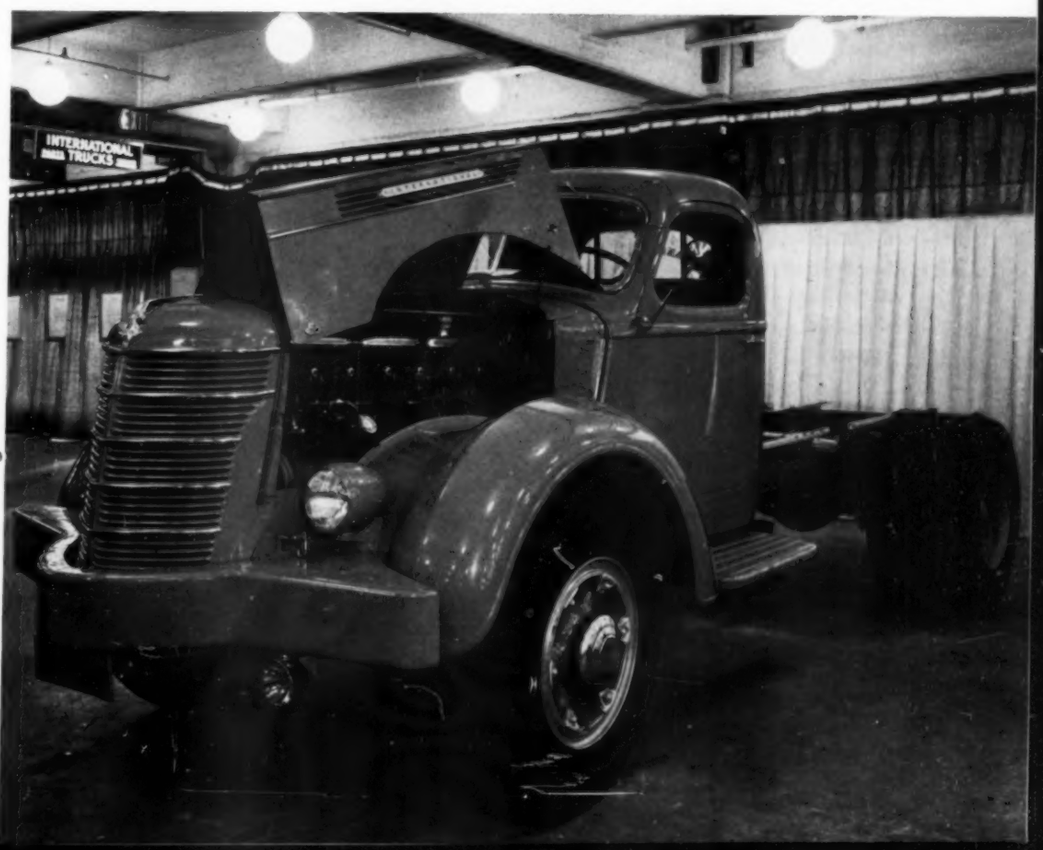
The new building which Cummins Engine Co. is at present erecting is being built by the Austin Co. and is equipped with the finest and most accurate machinery possible to buy: It is said that the completed project will represent an expenditure of approximately $400,000. It will be used exclusively for the finish and assembly of Cummins Diesel fuel injectors and the assembly of Diesel fuel pumps.

Power for this new building will be generated by a 500 hp. 12-cylinder Cummins Diesel engine. Exhaust gas and cooling water from the engine will be reclaimed and used in heating the building.

One of the real old timers in the business, the Cummins Engine Company has consistently climbed up in production year after year, until 1938 is their best year to date, with 1939 already clamoring for its own record.

Above — A typical standardized Cummins Diesel engine installation in this Autocar-Diesel truck, a Model RLF 3 ton job, powered with a six cylinder 4" x 5" Cummins.

Below — International Harvester offers 12 Diesel models equipped with Cummins engines. This is their Model DRB-70 10 ton capacity truck, equipped with a 6 cylinder Model HB Cummins.



General view of the J. W. Mortell Company's plant where a Caterpillar Diesel is successfully and economically meeting an increased power demand.

DIESEL SERVES INDUSTRIAL PAINT PLANT

EXPANSION by the installation of a small Diesel power unit, instead of increasing the electrical demand, has proven unusually satisfactory and economical to the J. W. Mortell Co., manufacturers of industrial paints.

About a year ago, the company first began producing its "Chassis Black" paint. This salt-spray, resistant, sunproof, low cost mixture, proved an immediate success. Facilities would not allow production to meet the demand from the automobile and railroad industries, which are the principal markets for the company's products.

Previous to the expansion, the company's big plant at Kankakee, Ill., was completely powered by electricity. Demand for the new product, however, necessitated an increase in power, and to keep operating expenses as low as possible, the company began to consider Diesel power.

An investigation of the power requirements to turn one 5 x 6 ft. ball mill, large enough to grind 600 gallons of pigment and thoroughly mix it with the naphtha bases, showed that the operating expenses, if electricity were used, would run approximately 2¾ cents per kwh., and that a motor of about 19 kw. would be required.

For a power expansion of the size and type required, the company decided to try a Diesel engine and installed a four cylinder, 44 hp. "Caterpillar." Turning at 1,400 rpm., this engine developed sufficient horsepower to handle easily two 5 x 6 ft. mills, when increased production should make further expansion necessary.

The "Caterpillar" D4400 engine was installed in February and by April the first mill was set up and the engine went to work. In the first 350 hours of operation, 470 gallons of 5½ cent Diesel fuel were used. The company's figures showed that the average operating costs, including fuel, lubricating oil and maintenance, was only 9¾ cents an hour — well under one-third the cost of electricity.

Currently, a second ball mill is being installed. This will increase production twofold, and should comparatively reduce operating costs almost accordingly. The increased load will cause a fuel consumption increase of only about ¼ gallon an hour, the company estimates.

The Diesel drives the ball mill through two speed reductions by means of a V-belt and a chain. It takes eight hours for a "grind" and the engine runs eight, sixteen or twenty-four hours a day, depending upon the amount of paint produced in a 24-hour period. Pigments and other solids are put into the mill, where they are mixed with naphthas and other paint bases. Here they are ground together until a fine, smooth syrup is formed. In an eight-hour grind, 600 gallons of "Chassis Black" syrup can be made. This, mixed with an even amount of additional liquid bases, will result in 1,200 gallons of finished product.

By an arrangement of clutches, the engine is also hooked up to a pump, and the Diesel generated power is thus utilized to empty the ball mill after the grind is completed. The syrup is pumped through a 25 ft. lift for a distance of about 100 ft. to a storage room. Here it is kept in 10,000 gallon storage tanks. It requires about 15 minutes for the pump to empty the ball mill.

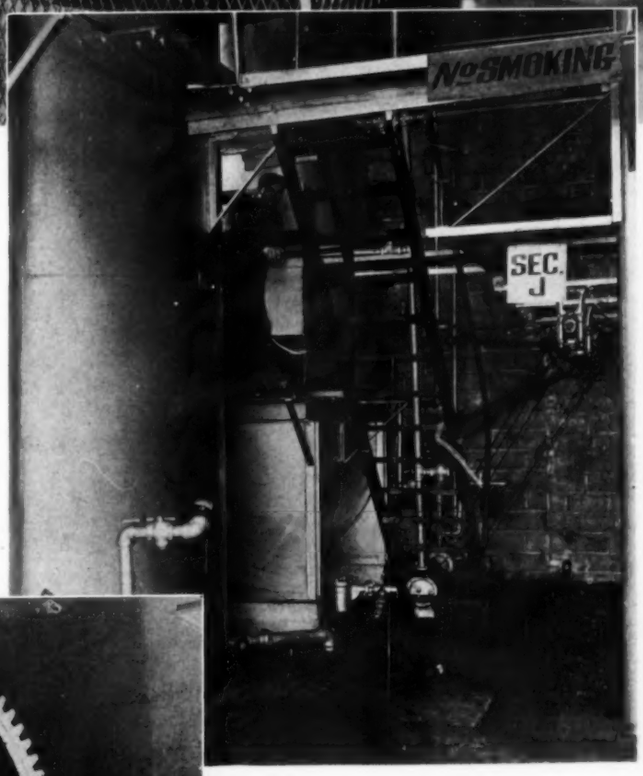
The engine is installed in the corner of a large factory room and is not isolated by either walls or sound proofing. With the exhaust muffled, however, all objectionable noise is avoided.

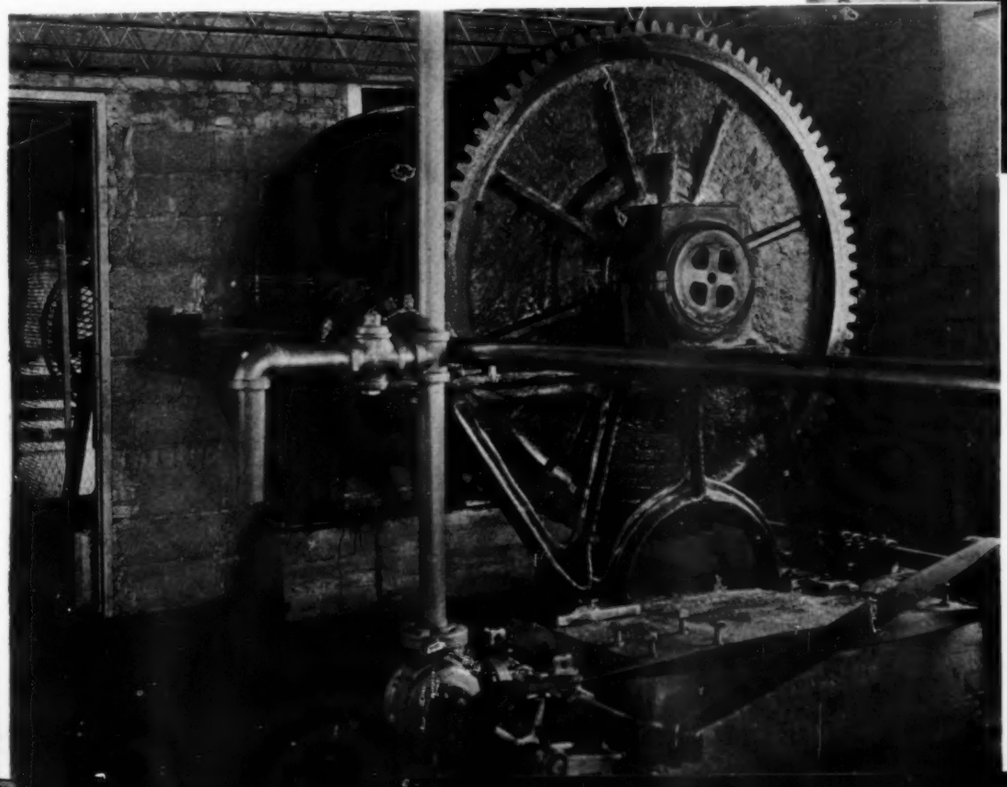
The shafts driving the equipment extend through the wall at the rear of the engine, and the mill and pump are in an adjoining room. The standard Diesel engine with a blower fan installed provides heat for this room. The hot air from the engine is passed through a flue

into the ball mill room. When the weather is warm, the current of heated air can be deflected outside.

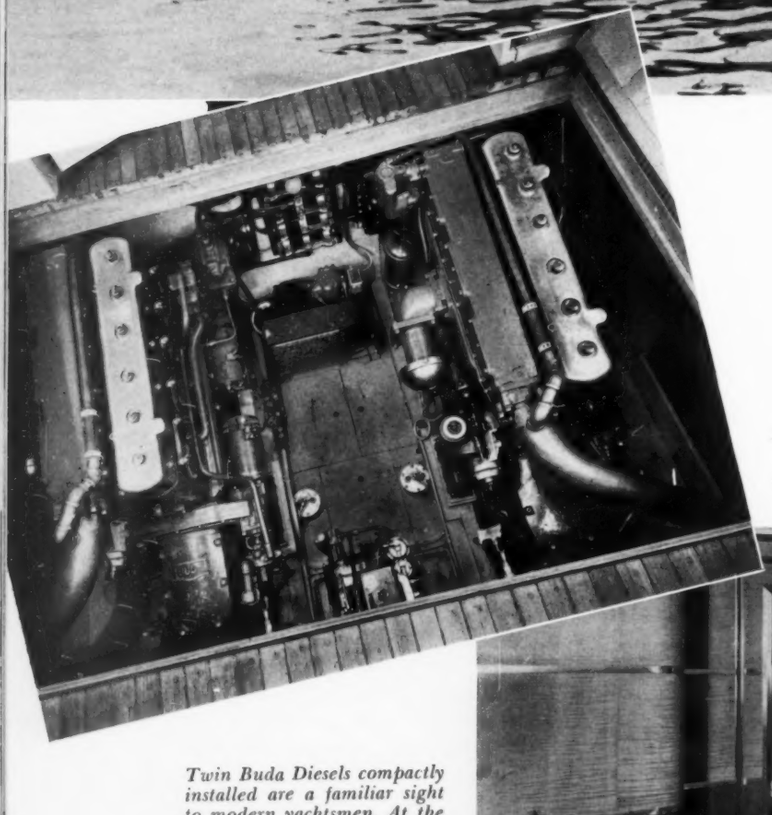
Diesel fuel for the engine is stored in a 10,000 gallon tank, and from there it is transferred by pump to a 500 gallon tank, where it flows by gravity to the engine. The fuel can be safely stored in these quantities only because of the lack of fire hazard entailed. Most of the ingredients of the paints manufactured by the company are highly inflammable.

Caterpillar Diesel driving a 5 by 6 foot ball mill and pump for mixing paint and transferring to storage tanks. 6,000 gallons are ground per eight-hour shift with an average cost for fuel and lubricating oil of 75 cents.



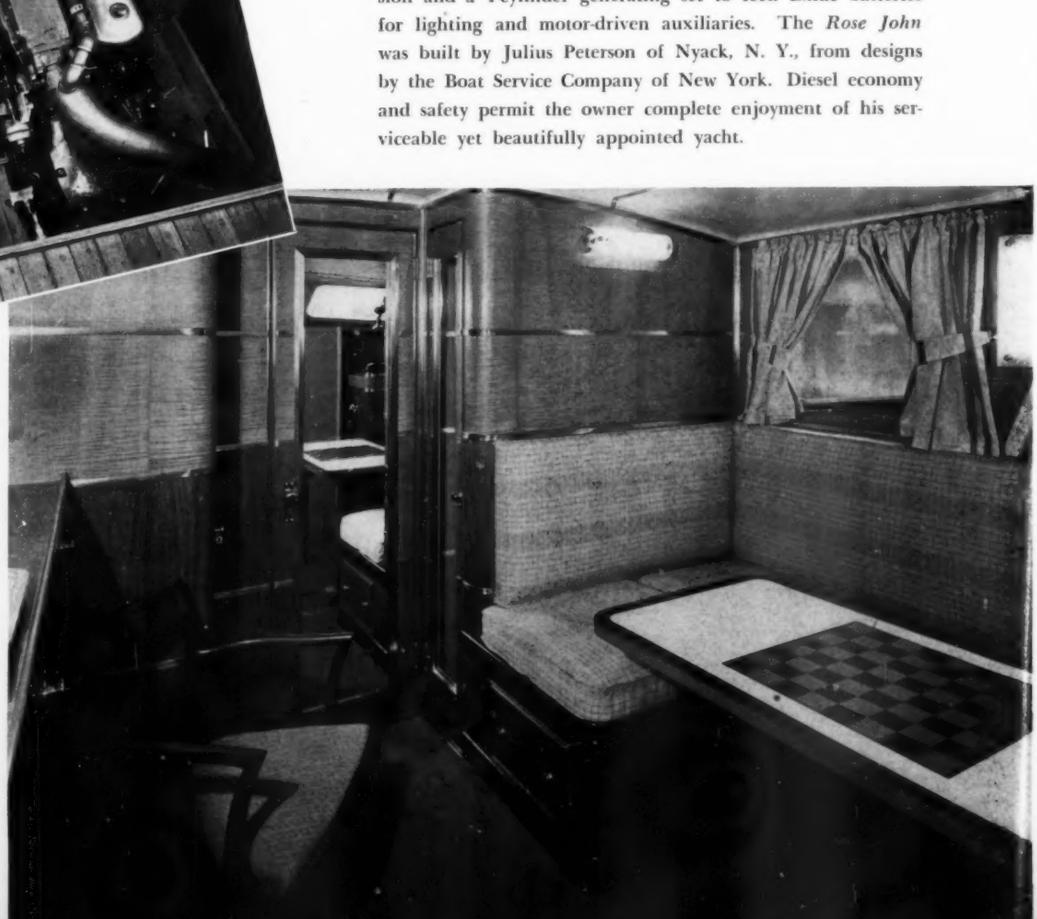


View of the ball mill. The Diesel is installed beyond the cement block wall at the rear. The unit frequently operates three 8-hour shifts per day.

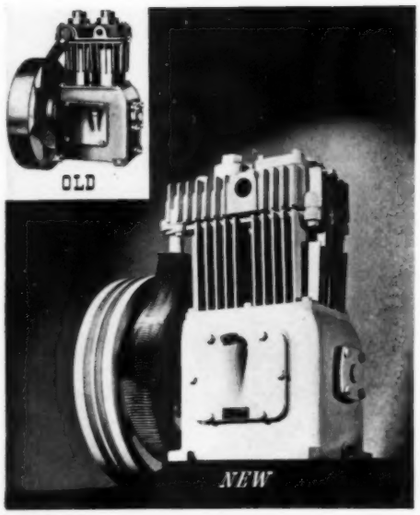


"ROSE JOHN"

ONE of the finest combination fishing boat and cabin cruisers was ordered by mail by Mr. John B. Hoover of Manila and is now giving splendid service in Philippine waters. Of course she is Diesel with a pair of 110 hp. Budas for propulsion and a 4-cylinder generating set to feed Exide batteries for lighting and motor-driven auxiliaries. The *Rose John* was built by Julius Peterson of Nyack, N. Y., from designs by the Boat Service Company of New York. Diesel economy and safety permit the owner complete enjoyment of his serviceable yet beautifully appointed yacht.



Twin Buda Diesels compactly installed are a familiar sight to modern yachtsmen. At the right is shown a corner of the main cabin with its pleasing trim of rare woods. The tasteful decoration of this trim craft is exceeded only by her dependability.



NINE new and improved Quincy air compressors are being currently announced, according to J. T. Conder, sales manager of the Quincy Compressor Co., Quincy, Ill. These distinctive examples of modern machine design are the result of a conviction on the part of this manufacturer that air compressors deserve to be as good looking as they are efficient.

In addition to their compact, more business-like appearance, improved over-all efficiency is also claimed for these new Quincy compressors. This is the result of many important mechanical refinements which include simplified construction, 12 per cent greater radiation area on cylinders, a more thorough and more positive constant level oiling system, totally enclosed, dustproof crankcases and non-breakable, cushioned discharge valves that make operation smoother and quieter.

When furnished for automatic start and stop operation, these compressors come equipped with a loadless starting device which automatically withholds all load from motor until it reaches full speed. This device also eliminates the need for check valves.

Sizes range from 2.8 to 30.1 cubic feet per minute piston displacement. Single stage-single cylinder, single stage-duplex cylinders and two-stage models are available in wide variety of standard and special mountings.

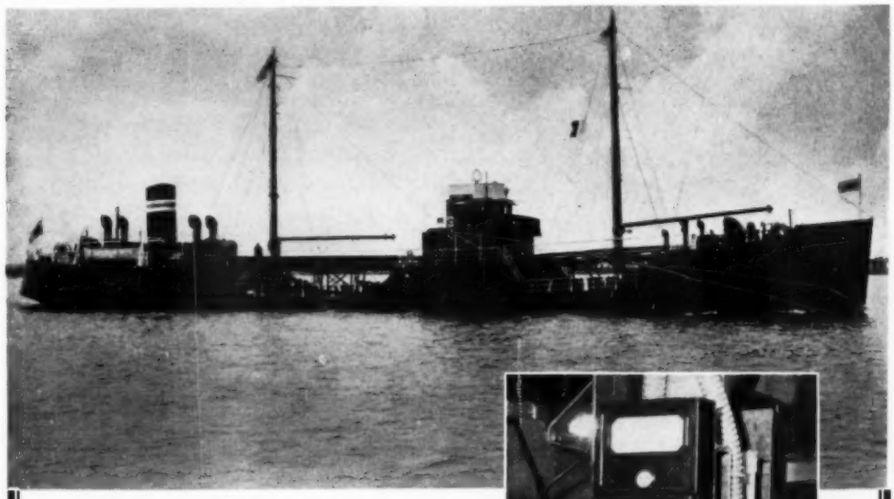
H. Wood Miller, industrial designer, created the new exterior design of these compressors.

DODGE ANNOUNCES PRICES OF NEW DIESEL TRUCK

CLOSE on the heels of the introduction of the new Dodge Diesel truck comes the announcement by J. D. Burke, Director of Dodge Truck Sales, that the new Dodge 3-ton Diesel line will include chassis ranging in wheelbase from 152 inches to 205 inches, and that delivered at Detroit prices will range from $3,230 for the 152 inch wheelbase chassis to $3,450 for the 205 inch wheelbase chassis with cab fully equipped.

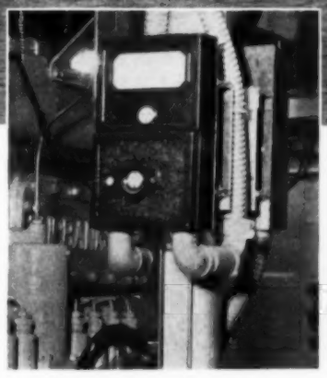
The new Dodge Diesel truck is available in four wheelbase lengths: 152, 170, 180 and 205 inches. Mr. Burke in announcing the Diesel price range and the four wheelbase lengths, emphasized that the new Dodge product is a Dodge-built Diesel, engineered and manufactured in the company's own plant.

The new Dodge Diesel truck, available only in the 3-ton range, is an addition to an entirely new line of Dodge trucks which will be manufactured in a giant new factory said to be the industry's most modern and efficient truck plant. This Dodge-Lanova Diesel power plant introduced by Dodge Truck Division was described in December issue of DIESEL PROGRESS.



One of the two Oil Tankers recently built for The Imperial Oil Shipping Company, Ltd., of Toronto, Canada.

Main engines two F-M Model 37, 2 cycle, 7 cylinder Diesels, 730 hp. at 400 rpm., furnished by Canadian Fairbanks, Morse and Company. "Alnor" Exhaust Pyrometer shown at right serves these Diesels.



"ALNOR" Pyrometers Serve F-M Diesels on Imperial Oil Tankers

• The two new Imperial Oil Tankers will see extensive service under varied and often severe conditions.

One of these tankers will operate on the West Coast of South America and the other on the Coast of British Columbia.

The Diesels of each tanker are protected by "Alnor" Rectangular style Exhaust Pyrometers built to give long, accurate service. With the rugged construction, water- and oil-proof cases, long easily-read scale, the "Alnor" Rectangular type Pyrometer is ideal for marine service.

Write for full information.

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TESTING ENGINEERS AND MANUFACTURERS

"Alnor" and Price Measuring Instruments

MAXIM SILENCERS
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ADRIAN POWER PLANT

Following the example of so many other progressive communities, Adrian, Michigan, has recently built a cooperative power plant—naturally with Diesel power and Maxim Exhaust Silencers.

Each 550 H.P. Fairbanks-Morse engine is fitted with a Maxim DO4 exhaust silencer to insure permanent silence—*A* Maxim is positive assurance of a noise-free installation. Solve your noise problems the Maxim way. Write for full details.

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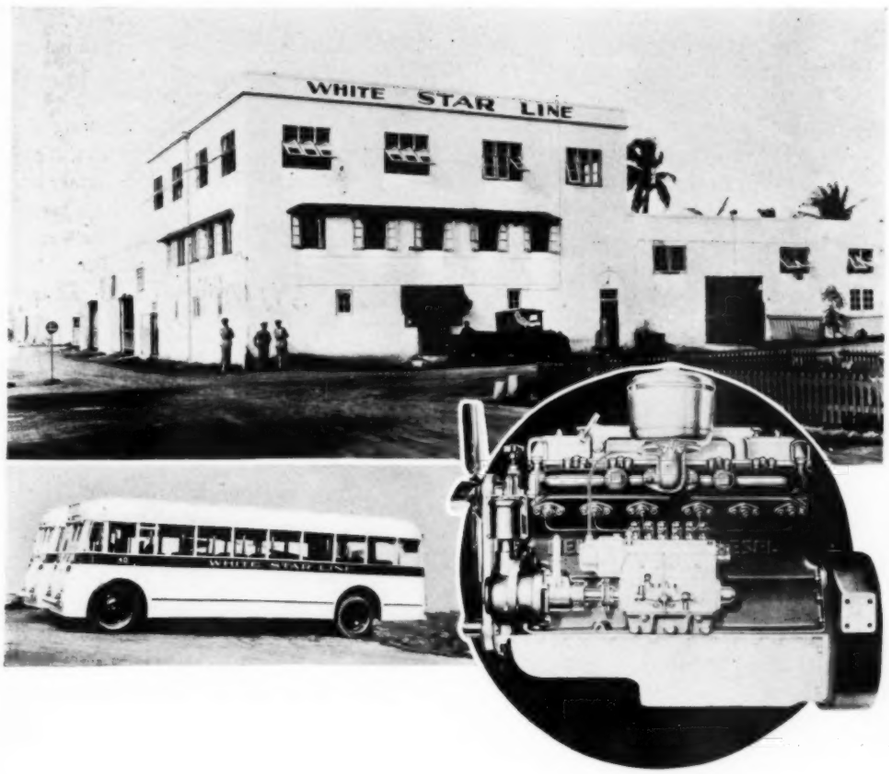
NEW VORTEX SYNCRO-SILENCER FOR DIESEL ENGINES

ENGINEERING SPECIALTIES CO., INC., of 39 Cortlandt St., New York City, announces the Vortex Syncro-Silencer for both marine and stationary Diesel engines. It is claimed that this newly developed unit shows a decidedly lower decibel rating than has been previously possible for commercial mufflers of corresponding size and cost. Back pressure also is claimed to be much less on the same basis, which is extremely important, epecially for two cycle and opposed piston type engines.

To explain the operating principles of the new Vortex Syncro-Silencer, it is necessary to review the conditions under which exhaust noise originates and develops. Experiments show that after each explosion exhaust gas leaves an engine cylinder ballistically as a resilient mass. It has also been demonstrated that sound waves precede such a theoretical "projectile" with different frequencies, according to the individual operating characteristics of each engine. Further complications often arise from coincidence of an engine frequency harmonic with the resonance frequency of the exhaust manifold and piping, as well as combinations of sub-harmonic frequencies of the exhaust system as a whole. Obviously, therefore, unless all of these noise propagating conditions are satisfied, most efficient silencing cannot be attained.

The new Vortex Syncro-Silencer is specifically designed to synchronize correct silencing properties with each and all exhaust noise conditions from the initial explosion in the combustion chamber to atmospheric discharge from the tail-pipe. In external physical appearance and size, it is similar to previous commercial types. Internal construction from the standpoint of ruggedness and durability, as well as silencing, is commercially satisfactory since its high efficiency depends upon accurate engineering rather than complicated design. Actually there is a "stepping down" process than can be likened to replacing a sharply vertical waterfall with a series of gentle slopes. The same volume of water falls the same vertical distance in the same direction, but without the roar and impact of one sheer, uncontrolled drop. Similarly, the exhaust gas impulses and sound waves are stepped down to discharge quietly, without appreciable back-pressure, change of direction of power-consuming obstructions.



ORDERS PLACED FOR NEW EQUIPMENT BY WHITE STAR BUS LINE, INC.

FOLLOWING a 25-year renewal of its operating franchise and the granting of a loan by the Reconstruction Finance Corporation, White Star Bus Line, Inc., Hato Rey, Puerto Rico, is carrying out large-scale plans for modernizing its San Juan, Puerto Rico, transportation equipment.

When the loan was granted provision was made that a considerable portion was to be used for equipment rehabilitation, replacement and addition. Thirty Hercules Diesel engines, Model DJXC, 3¾" x 4½", have been purchased for replacement in Yellow Coaches. The company has also purchased thirty Model 800 White Bus chassis, powered with Hercules six-cylinder gasoline engines Model QXC-3, 3⅜" x 4⅛". Hercules Diesel engines have been specified for additional equipment.

Negotiations which resulted in the placing of the orders were conducted through Stubbe Bros. of San Juan, Puerto Rico, the Hercules Motors Corporation dealer.

San Juan is a thriving city of about 125,000 population. White Star Bus Line, Inc., operates upwards of 175 buses and carries an average of 75,000 passengers daily. Ten cent and five cent fares are in effect, approximately two-thirds of the passengers paying the five cent fare.

White Star Bus Line, Inc., of which Mr. Rafael Arselay is president, builds the bodies of its buses in its own shops.

The completion of the present expansion program will provide San Juan and its immediate suburban areas with modern transportation facilities equalled by few cities in the United States – and it is believed will give this city a larger percentage of Diesel-powered buses than any other American municipality.

LAKE WORTH, FLA., IN MARKET

THE City Commission of Lake Worth, Florida, is seriously considering the purchase of either one or two more Diesel engines to a total capacity of approximately 1,800 hp.

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made of
Carbon-Alloy-Nitralloy Steels
Corrosion, Wear and Heat Resisting
17 Years Engineering and Manufacturing Experience at Your Service
Reg.
Trade OSP Mark
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DIESEL ENGINES
STATIONARY—MARINE
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1—300 HP Winton Diesel stationary engine. Many new parts still crated included.
1—120 HP Fairbanks-Morse semi Diesel engine with 90 KW 2300 volts generator and exciter complete.
1—25 HP Fairbanks-Morse Diesel engine with clutch pulley.
2—100 HP Tipps semi Diesel engines with 60 KW Generator sets and exciter and switchboards.
2—60 HP Fairbanks-Morse semi Diesel engine with starting equipment.
All these engines can be inspected and are priced for immediate sale. For further information wire or write
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FITTER — "I am on my fifth month as a fitter in the parts and assembly department."—G.R.C.

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For capable Diesel men call on
HEMPHILL DIESEL SCHOOLS
Consult or write our employment directors at any of our schools:
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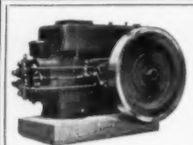
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Bosch pump — Bosch nozzle
Delivered Complete — Ready for Service
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ENGLEWOOD, NEW JERSEY

ADRIAN, MICH.

(*Continued from page 23*)

There are five pumps in line in the cooling system, two for circulating the soft water, two for circulating the raw water, and one which serves as a spare and can be put into operation in either system. Makeup water is supplied from the City of Adrian system. Water for the closed systems is treated by a Permutit softener.

The lubricating oil system consists of Sentinel filters, a Skinner purifier, and three storage tanks. The oil is polished by by-passing part of it through the filters as it flows through the system. One tank is for scraper oil, one for clean oil storage, and one for engine draining. The Skinner purifier is used for batch purifying the dirty oil.

Heating of the building is done by circulating the soft water of the engine cooling systems through unit heaters. These heaters have ample radiating surface, and are equipped with variable speed motor driven fans. Much of the heat for the generator room is supplied by radiation from the units, and from the exhaust pipes which are located below gratings in the floor.

The plant is located adjacent to the City of Adrian, Mich. It furnishes current for a rural system of 320 miles of lines running through one of the most fertile agricultural districts in the United States.

All of the generating equipment from the fuel oil storage tanks to the pot heads at the substation, including switch gear, station transformers, cooling tower, and all auxiliary equipment, was furnished and installed by Fairbanks, Morse & Co. The switchboard was manufactured by the General Electric Co.

The organization of farmers sponsoring the project is known as the Southeastern Michigan Rural Electric Cooperative. The money for building the plant and the system was loaned to the Cooperative by the Rural Electrification Administration. This Administration furnished general supervision of the organizing and construction of the project.

William Thompson is President of the Board of Directors of the Cooperative. Clifton C. Nye was superintendent of the project during most of the construction period, and is continuing his services as project manager as the project goes into operation. The author was project engineer in the design and construction of the generating plant and the distribution system.

BARGE LINE BUYS TWO

THE American Barge Line Co. has placed a contract with the Treadwell Construction Co. of Midland, Pa., for building a new and powerful towboat. Upon completion, the hull will be taken to the yards of the American Barge Line Co. at Louisville, Ky., where the machinery will be installed and the vessel prepared for entry into service on the Ohio and Mississippi Rivers. Dimensions for the vessel's hull are given as 160 ft. long, 40 ft. wide, and 8 ft. deep. This new towboat is to be powered with two Cooper-Bessemer Type LT Diesel engines of eight cylinders, each rated 1,000 hp. and driving twin screws. The engines are scheduled for delivery about April 1st and the vessel is expected to be completed sometime in June.

The Automotive Maintenance Machinery Co., North Chicago, Illinois, now has a complete line of AMMCO Tension Indicators designed to provide uniform tightening of bolts to a predetermined stress. These tension indicators can be used to very good advantage in connection with Diesel engines on cylinder head studs and bolts; main bearing bolts; fuel injector bolts, and exhaust manifold bolts.

EVERYWHERE IN THE WORLD **PETROMETERS** INDICATE DIESEL OIL SUPPLY **PETROMETERS** INDICATE FUEL OIL SUPPLY **PETROMETERS** INDICATE EVERY KIND OF LIQUID **PETROMETERS** INDICATE GALLONS OR WEIGHT **PETROMETERS** INDICATE IN EVERY TYPE OF TANK **PETROMETERS** INDICATE EXCELLENT SERVICE **PETROMETERS** BUY BUY BUY **PETROMETERS** FOR THE BEST INSTALLATIONS **PETROMETER CORPORATION** 5 STAR SQUARE, LONG ISLAND CITY, N. Y.

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IN TRANSPORTATION